Installation instructions

DHP-A
DHP-A Opti
DHP-AL
DHP-AL Opti
DHP-C
DHP-H
DHP-H Opti
DHP-H Opti Pro
DHP-L
DHP-L Opti
DHP-L Opti Pro

VMBMA1002

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The Swedish language is used for the original instructions. Other languages are a translation of original instructions.
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1 About documents and decals

1.1 Introduction

The following documents are available for this product:

- Installation instructions containing information to install and commission a heat pump installation. Supplied with the heat pump on delivery.
- The service instructions contain information about the heat pump's function, accessories, fault tracing and technical data. The instructions also contain tips and advice that should be followed before a heat pump installation. It is therefore recommended that the instructions are read before installation.
  The service instructions are available for download as below.
- The electrical instructions that contain the wiring diagram for the heat pump intended for fault tracing and service. The electrical instructions are available for download as below.
- The maintenance instructions must handed over and gone through with the end customer. Supplied with the heat pump on delivery.
- Country specific instructions and forms are available where relevant. Supplied with the heat pump on delivery.
- Self-adhesive decals with translation text. Must be placed on the manufacturing plate in conjunction with installation. Supplied with the heat pump on delivery.

The Service instructions and Electrical instructions are available for download here:

www.documentation.heatpump.danfoss.com

1.2 Symbols in documents

The instructions contain different warning symbols, which, together with text, indicate to the user that there are risks involved with actions to be taken.

The symbols are displayed to the left of the text and three different symbols are used to indicate the degree of danger:

DANGER! Indicates an immediate danger that leads to fatal or serious injury if necessary measures are not taken.

Warning! Risk of personal injury!Indicates a possible danger that can lead to fatal or serious injury if necessary measures are not taken.

Caution! Risk of installation damage.Indicates a possible hazard that can lead to item damage if necessary measures are not taken.

A fourth symbol is used to give practical information or tips on how to perform a procedure.

Note! Information regarding making the handling of the installation easier or a possible operational technical disadvantage.

1.3 Symbols on decals

The following symbols can occur on decals on the different parts of the heat pump. Which symbols are used depends on the heat pump model.

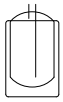
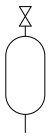
	Warning, danger!
	Read the documentation provided.
	Read the documentation provided.
	Warning, hazardous electrical voltage!
	Warning, hot surfaces!
	Warning, moving parts!
	Warning, risk of crushing injury!

Electrical components

⬭	Component, normal	⬭	Component, accessory

3	Outdoor unit	353	Drip tray
50	Outdoor sensor	362	Shunt valve
54	Hot water sensor	406	Room sensor
55	Sensor hot-water top	408	EVU
71	Flow guard	417	Defrost sensor

Pipe connections

	Tap water
	Heating system
	Brine
	Defrosting tank
	Expansion tank with safety valve, brine
	Bleeding
	Temperature and pressure relief valve
	Outdoor unit
	Water heater

2 Important information/Safety regulations

Warning! Risk of personal injury! Children are not permitted to play with the product.

Warning! As the water temperature in DHP-H Opti Pro and DHP-L Opti Pro becomes extremely hot, a mixer valve must be installed between the cold water and hot water pipes to ensure a lower domestic hot water temperature.Alternatively the maximum hot water temperature must be reduced in the Service menu.

Warning! Danfoss SP (1-phase) heat pumps have a factory installed safety valve for temperature and pressure, (10 bar 90-95°C), in accordance with the requirements in Great Britain. This valve is located in the water tank and may not be used for any purpose other than connecting the outlet pipe.
Also note that for heat pump DHP-H Opti Pro SP and DHP-L Opti Pro SP it is imperative that the hot water temperature is changed from default setting 95°C to 85°C.

Caution! The heat pump must be installed by authorised installation engineers and the installation must follow the applicable local rules and regulations as well as these installation instructions.

Caution! This product is not intended for persons (including children) with reduced physical, sensory or psychological capacity, or who do not have knowledge or experience, unless supervised or they have received instructions on how the apparatus functions from a safety qualified person.

Caution! The heat pump must be located in a frost-free environment!

Caution! The heat pump must be placed in an area with a floor drain.

Caution! The heat pump must be located on a stable base. The floor must be able to support the gross weight of the heat pump with filled hot water tank (see Technical data).

Caution! To prevent leaks, ensure that there are no stresses in the connecting pipes!

Caution! It is important that the heating system is bled after installation.

Caution! Bleed valves must be installed where necessary.

Caution! The hot water tank must be equipped with an approved safety valve.

Caution! Heating systems with closed expansion tanks must also be supplied with approved pressure gauges and safety valves.

Caution! Cold and hot water pipes and overflow pipes from safety valves must be made of heat resistant and corrosion-resistant material, e.g. copper. The safety valve overflow pipes must have an open connection to the drain and visibly flow into this in a frost-free environment.

Caution! The connecting pipe between the expansion tank and the safety valve must slope continuously upwards. A continuous upwards slope means that the pipe must not slope downwards from the horizontal at any point.

Note! If there is any risk of groundwater infiltration at wall lead-ins for brine pipes, watertight grommets must be used.

Note! In addition to applicable local rules and regulations the installation should be carried out in a manner that prevents vibrations from the heat pump being transmitted into the house causing noise.

2.1 Refrigerant

Caution! Work on the refrigerant circuit must only be carried out by a certified engineer!

Although the heat pump cooling system (refrigerant circuit) is filled with a chlorine-free and environmentally-approved refrigerant that will not affect the ozone layer, work on this system may only be carried out by authorized persons.

2.1.1 Fire risk

The refrigerant is not combustible or explosive in normal conditions.

2.1.2 Toxicity

In normal use and normal conditions the refrigerant has low toxicity. However, although the toxicity of the refrigerant is low, it can cause injury (or be highly dangerous) in abnormal circumstances or where deliberately abused.

Warning! Risk of personal injury! Spaces in which heavy vapour can collect below the level of the air must be well ventilated.

Refrigerant vapour is heavier than air and, in enclosed spaces below the level of a door for example, and in the event of leakage, concentrations can arise with a resultant risk of suffocation due to a lack of oxygen.

Warning! Risk of personal injury! Refrigerant exposed to a naked flame creates a poisonous irritating gas. This gas can be detected by its odour even at concentrations below its permitted levels. Evacuate the area until it has been sufficiently ventilated.

2.1.3 Work on the refrigerant circuit

Caution! When repairing the refrigerant circuit, the refrigerant must not be released from the heat pump, it must treated in the appropriate way.

Draining and refilling must only be carried out using new refrigerant (for the amount and type of refrigerant see manufacturer's plate) through the service valves.

Caution! All warranties from Danfoss are void if, when filling with refrigerant other than Danfoss A/S specified refrigerant, if there has not been written notification that the new refrigerant is an approved replacement refrigerant together with other remedies.

2.1.4 Scrapping

Caution! When the heat pump is to be scrapped the refrigerant must be extracted for disposal. Local rules and regulations related to the disposal of refrigerant must be followed.

2.2 Electrical connection

Caution! Electrical installation may only be carried out by an authorized electrician and must follow applicable local and national regulations.

Caution! The electrical installation must be carried out using permanently routed cables. It must be possible to isolate the power supply using an all-pole circuit breaker with a minimum contact gap of 3 mm. (The maximum load for externally connected units is 2A).

DANGER! Hazardous electrical voltage! The terminal blocks are live and can be highly dangerous due to the risk of electric shock. All power supplies must be isolated before electrical installation is started. The heat pump is connected internally at the factory, for this reason electrical installation consists mainly of the connection of the power supply.

2.3 Commissioning

Caution! The installation may only be commissioned if the heating system and brine system have been filled and bled. Otherwise the circulation pumps can be damaged.

Caution! If the installation is only to be driven by an auxiliary heater during the installation, ensure that the heating system is filled and the brine pump and compressor cannot be started. This is carried out by setting the operating mode to AUX. HEATER.

3 Heat pump data, dimensions and connections

3.1 DHP-H, DHP-H Opti

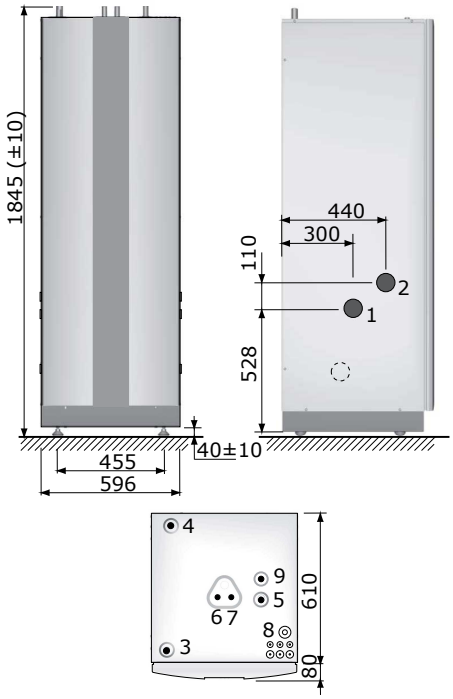


Figure 1. Dimensions and connections

Symbol explanation

1	Brine in, 28 Cu
2	Brine out, 28 Cu
3	Heating system supply pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
4	Heating system return pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
5	Connection for bleed valve, 22 Cu
6	Hot water line, 22 mm
7	Cold water line, 22 mm
8	Lead-in for supply, sensor and communication cables
9	Safety valve for temperature and pressure (only applies to certain models)

The brine pipes can be connected on either the left or right-hand sides of the heat pump.

3.2 DHP-H Opti Pro

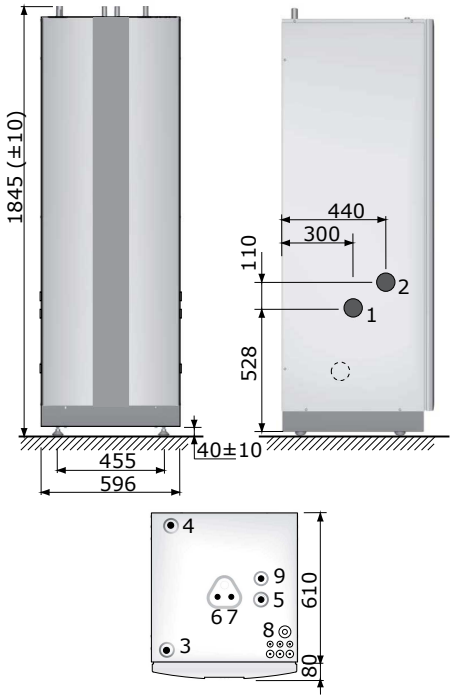


Figure 2. Dimensions and connections

Symbol explanation

1	Brine in, 28 Cu
2	Brine out, 28 Cu
3	Heating system supply pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
4	Heating system return pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
5	Connection for bleed valve, 22 Cu
6	Hot water line, 22 mm
7	Cold water line, 22 mm
8	Lead-in for supply, sensor and communication cables
9	Safety valve for temperature and pressure (only applies to certain models)

The brine pipes can be connected on either the left or right-hand sides of the heat pump.

3.3 DHP-C

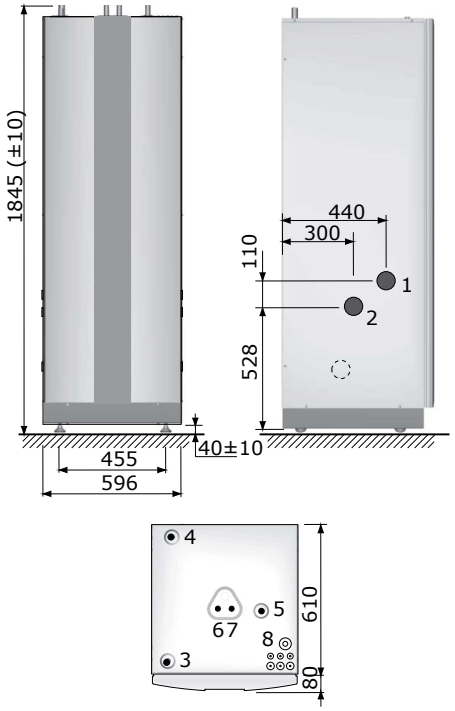


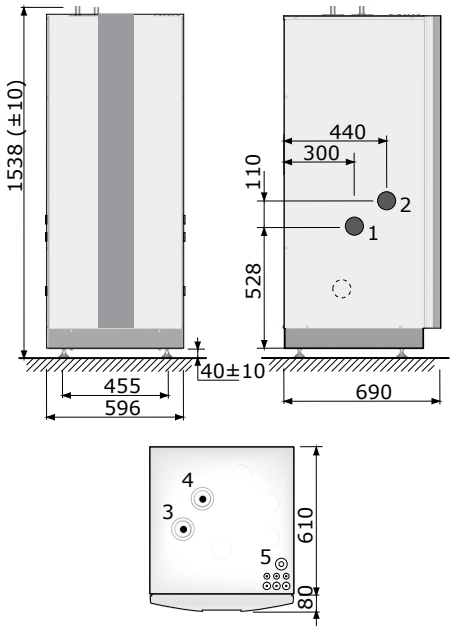
Figure 3. Dimensions and connections

Symbol explanation

1	Brine in, 28 Cu
2	Brine out, 28 Cu
3	Heating system supply pipe, 22 Cu
4	Heating system return pipe, 22 Cu
5	Connection for bleed valve, 22 Cu
6	Hot water line, 22 mm
7	Cold water line, 22 mm
8	Lead-in for supply, sensor and communication cables

The brine pipes can be connected on either the left or right-hand sides of the heat pump.

3.4 DHP-L, DHP-L Opti



Symbol explanation

1	Brine in, 28 Cu
2	Brine out, 28 Cu
3	Heating system supply pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
4	Heating system return pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
5	Lead-in for supply, sensor and communication cables

The brine pipes can be connected on either the left or right-hand sides of the heat pump.

3.5 DHP-L Opti Pro

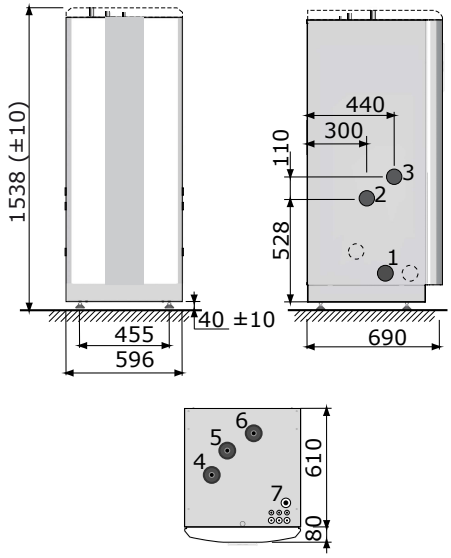


Figure 4. Dimensions and connections

Symbol explanation

1	Return line water heater, 22 (flexible hose)
2	Brine in, 28 Cu
3	Brine out, 28 Cu
4	Heating system supply pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
5	Heating system return pipe, 22 Cu: 4-10 kW, 28 Cu: 12-16 kW
6	Supply line water heater, 22 Cu
7	Lead-in for supply, sensor and communication cables

The brine lines (2), (3) and return line water heater (1) can be connected on the right or left-hand sides.

3.6 DHP-A, DHP-A Opti

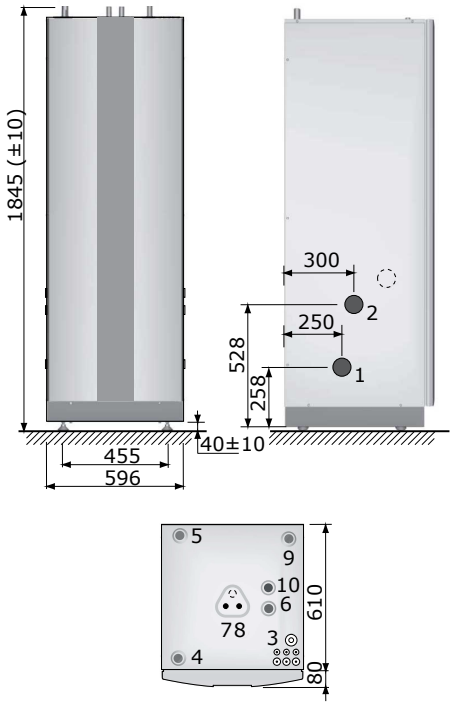


Figure 5. Dimensions and connections

Symbol explanation

1	Brine in, 28 Cu
2	Brine out, 28 Cu
3	Lead-in for supply, sensor and communication cables
4	Heating system supply pipe, 22 Cu: 6-10 kW, 28 Cu: 12 kW
5	Heating system return pipe, 22 Cu: 6-10 kW, 28 Cu: 12 kW
6	Connection for bleed valve, 22 Cu
7	Hot water line, 22 mm
8	Cold water line, 22 mm
9	Expansion outlet brine circuit, R25 int.
10	Safety valve for temperature and pressure (only applies to certain models)

The brine pipes can be connected on either the left or right-hand sides of the heat pump.

3.7 DHP-AL, DHP-AL Opti

The brine pipes can be connected on either the left or right-hand sides of the heat pump.

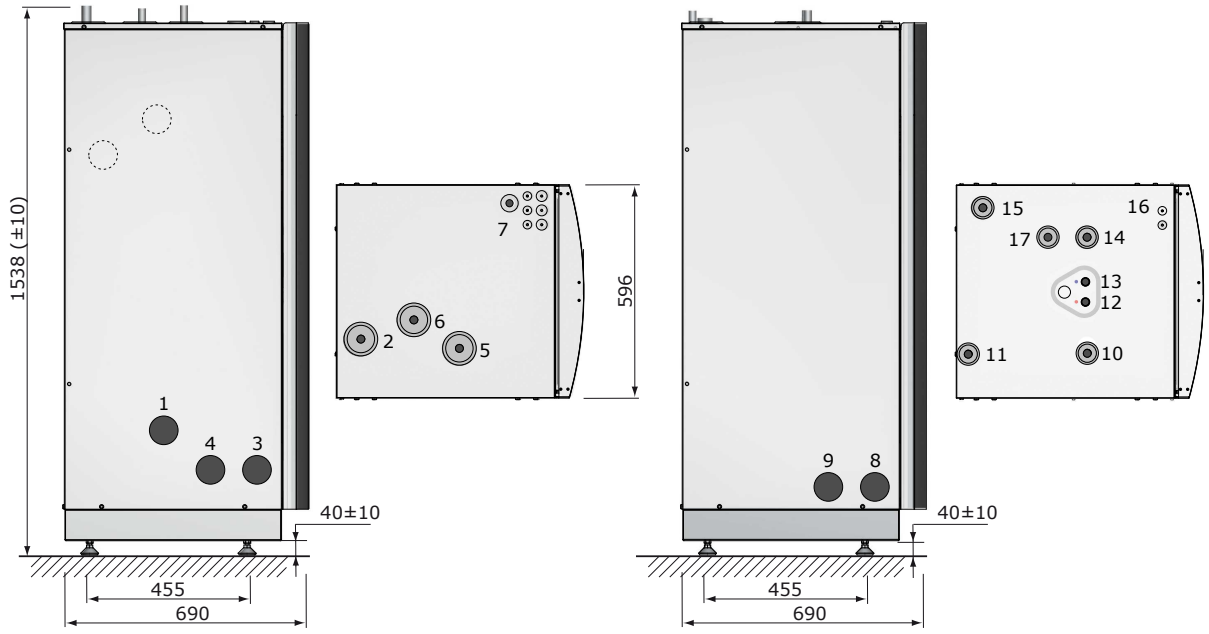


Figure 6. Dimensions and connections heat pump and water heater

Symbol explanation

Heat pump

1	Brine in, 28 Cu	5	Heating system supply pipe, 22 Cu: 6-10 kW, 28 Cu: 12 kW
2	Brine out, during normal operation, 28 Cu	6	Heating system return pipe, 22 Cu: 6-10 kW, 28 Cu: 12 kW
3	Brine out during defrosting to hwh pos 8, 28 Cu	7	Lead-in power and sensor lead
4	Return line from water heater pos 9, 28 Cu		

Symbol explanation

Water heater

8	Connection for brine out when defrosting from pos 3	13	Cold water line, 22 mm
9	Water heater, return pipe to pos 4	14	Supply to water heater coil
10	Bleed valve, at stainless steel water heater	15	Brine, expansion outlet when outdoor unit is positioned at high level
11	Brine out during defrosting, 28 Cu	16	Lead-in sensor lead
12	Hot water line, 22 mm	17	Safety valve for temperature and pressure (only applies to certain models)

3.8 Outdoor unit DHP-A, DHP-AL, DHP-A Opti, DHP-AL Opti

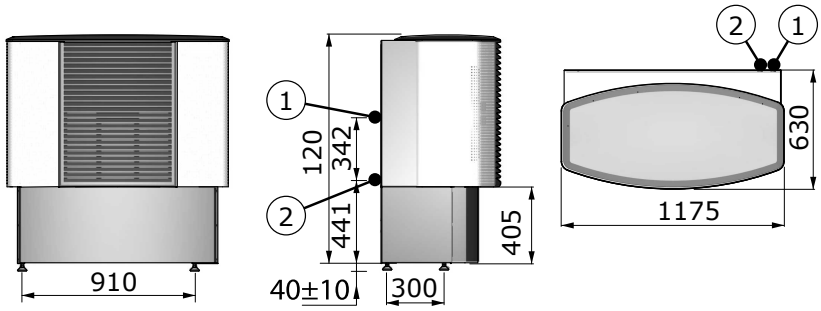


Figure 7. Outdoor unit, dimensions and connections.

Symbol explanation

1	Brine in, 28 Cu
2	Brine out, 28 Cu

4 Transport, unpacking and setting-up

4.1 Transporting the heat pump

Caution! During transportation or lifting of the entire heat pump, the front panel must always be installed as it locks the other panels construction.

Caution! The heat pump must always be transported and stored in a dry area. Secure the heat pump so that it cannot tip over during transportation.

When transporting indoors to the installation location it may be necessary to place the heat pump on its back. The time that the heat pump is transported on its back should be as short as possible. After the heat pump has been lifted up again it must stand upright for at least an hour before commissioning.

4.2 Unpacking heat pump

4.2.1 Delivery check

1. Check that there is no transport damage. The heat pump is packaged in cardboard.
2. Remove the packaging and check that the delivery contains the following components.

	Part number	4-10 kW	12-16 kW
Safety valve 9 bar 1/2"	086U2369	1	1
Safety valve 1.5 bar 1/2"	086U0896	1	1
Outdoor sensor	086U2701	1	1
Expansion and bleed tank	086U2824	1	1
Rubber bellows for 22-28 mm hole	086U3423	5	5
Flexible hose R20 L=550	086U6033	2	-
Flexible hose R25 L=550	086U6034	-	2
Filler device DN25	086U6006	1	-
Filler device DN32	086U6007	-	1
Dirt filter with shut-off DN20	086U3427	1	-
Dirt filter with shut-off DN25	086U6005	-	1
Manual holder	086U3988	1	1

4.3 Setting-up the heat pump

4.3.1 Recommended location

Caution! To avoid condensation problems for the brine lines, as short a brine line as possible is recommended indoors.

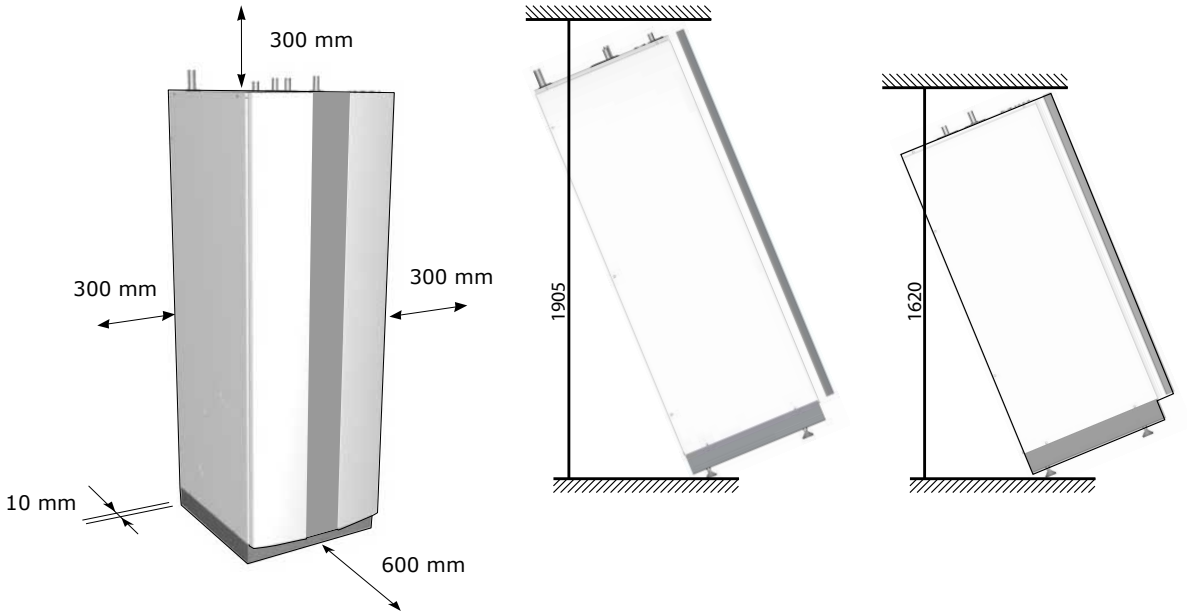
The heat pump should be located on a stable floor, preferably made of concrete. When locating the heat pump on a wooden floor this should be reinforced to take the weight of the heat pump including a filled water heater, see technical data for relevant heat pump. One solution is to place a thick metal plate, at least 6mm, under the heat pump. The metal plate should cover several joists spreading the weight of the heat pump over a larger area. If the heat pump is being installed in a newly-built house, this has normally been taken into account during construction, and the joists where the heat pump will be located have been reinforced. Always check that this has been carried out when installing into a newly-built house.

Avoid positioning the heat pump in a corner as the surrounding walls may amplify its noise. It is also important to adjust the heat pump using the adjustable feet so that it is horizontal to the base.

4.3.2 Space requirement

Caution! The heat pump must not be enclosed as the temperature inside the cabinet becomes extremely high.

To facilitate the installation and subsequent testing and maintenance there must be sufficient free space around the heat pump in accordance with the following image:



4.3.3 Setting up

Note! The heat pump has feet that can be adjusted to compensate for irregularities in the surface on which it is sitting. If the surface is so irregular that the feet cannot compensate for it, the installation engineer must remedy this.

Note! It is recommended that the condensation drain is installed from the drip tray's drain pipe by lying the heat pump down. The drain pipe opens through a hole in the base plate and has a Ø10 mm hose connection.

Note! If the heat pump has been laid down it is recommended that it stands upright for at least an hour before commissioning.

4.3.4 Removing the front cover

Caution! Do not damage the electrical wiring for the display when the front cover is removed!

To install the heat pump the front cover must be removed.

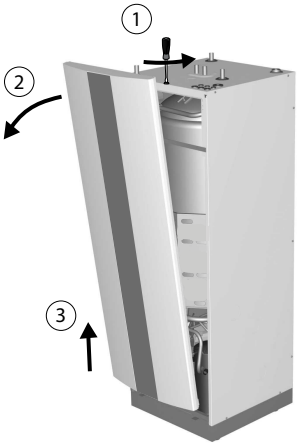


Figure 8. Removing the front cover

1. Press against the front cover and turn the catch 90° degrees anti-clockwise to release the front cover.
2. Tilt the front cover outwards.
3. Lift the front cover upwards to remove it from the heat pump.

4.4 Setting-up the outdoor unit

Note! Applies to DHP-A.

4.4.1 Recommended location

When positioning the outdoor unit, note the following:

Caution! When the outdoor unit is defrosting, water will drip straight down under the unit. The area around the outdoor unit must therefore be properly drained in order to take the water (approximately 2 litres per defrost).

Caution! The outdoor unit's adjustable stand must be positioned on a secure base such as wooden sleepers, paving slabs or cast footings.

Note! The outdoor unit does not have to be positioned in any specific direction.

Note! Noise is produced from the outdoor unit when the fan is in operation, remember this when positioning to reduce disturbance in your own home as well as to any neighbours.

4.4.2 Space requirement

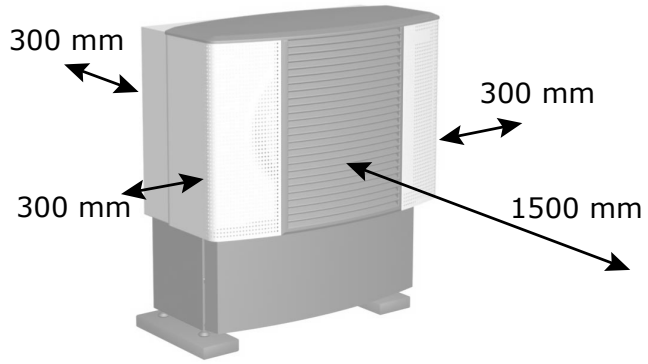


Figure 9. Necessary service space for outdoor unit.

4.4.3 Unpacking

The outdoor unit is packed and delivered in a crate.

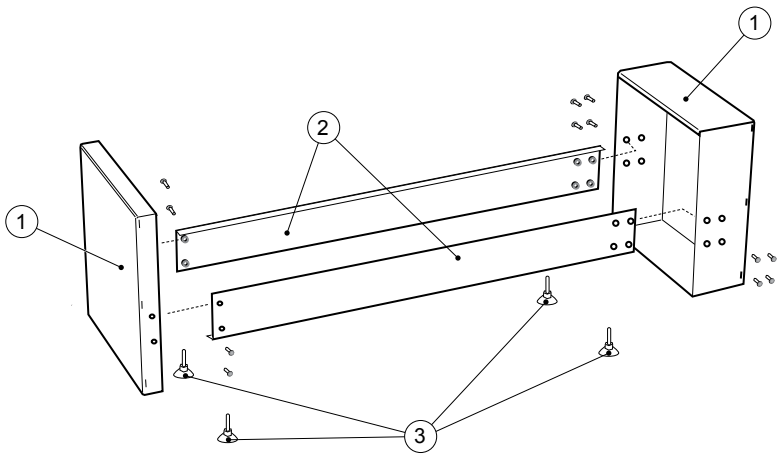
1. Start by unpacking the unit from the crate.
2. Check that the delivery is complete, it must contain the outdoor unit, front cover, cover as well as a disassembled stand including necessary screws, nuts and washers.

4.4.4 Installation

4.4.4.1 Assembling the stand

Assemble the stand

1. Screw the two horizontal struts together (2) using the two ends (1) as illustrated below. Use 10 x M6x10 screws. The curved edges of the horizontal struts must be facing inwards.



Symbol explanation

1	Ends
2	Strut
3	Feet

Figure 10. Assembling the stand

2. Screw the adjustable feet (3) into the holes under the ends.

4.4.4.2 Preparing the outdoor unit

While the outdoor unit remains on the pallet it should be prepared for placing on the stand. Carry out the following:

1. There are three M6x20 screws on the lower edge of the outdoor unit. Unscrew them so that 2-3 mm of the thread remains. Use a torx TX25 screwdriver, or equivalent.

Caution! Do not lift the outdoor unit by its side panels when it is to be raised or moved.

---

2. Raise the outdoor unit.
3. Remove the side plates. They are held in place by clamps and so are removed by pulling outwards.
4. Remove all four screwed lifting eyes. Use a 13 mm wrench, or equivalent.

4.4.4.3 Assembling the outdoor unit on the stand

1. Lift the outdoor unit into the place on the stand.
2. Screw the outdoor unit onto the stand. Use 4 x M6x20 screws. It may be necessary to push and pull the stand slightly in order to get the screw holes to align.

Caution! When filling the brine system the outdoor unit must be bled using the bleed screws on the connecting pipes inside the side covers. We recommend that you return to this instruction after the brine system has been filled.

---

3. Reinstall the side panels.

4.4.4.4 Assembling the defrost sensor

Figure 11. Hook the defroster sensor mounting into place

1. Slide the mounting for the defroster sensor into the hole on the reverse of the outdoor unit until the cover hooks into place on the edge.
2. Take out the defrosting sensor from the electrical connection box. Thread out the sensor through a suitable lead-in.
3. Route the defroster sensor connection cable through the cable lead-in to the mounting.
4. Secure the defroster sensor at the bottom of the mounting using a cable tie.

4.4.4.5 Assembling the front cover

1. Hook the lower edge of the front cover onto at least one of the three screws in the bottom edge of the stand.
2. Secure the upper edge of the front panel temporarily in the centre hole. Use 1 x M6x15 torx TX25.
3. Align all the three screws in the lower edge.
4. Screw the three screws in the lower edge fully. Use a torx TX25 screwdriver, or equivalent.

5. Secure the front panel's upper edge with the 2 x remaining M6x15 torx TX25, see figure below.

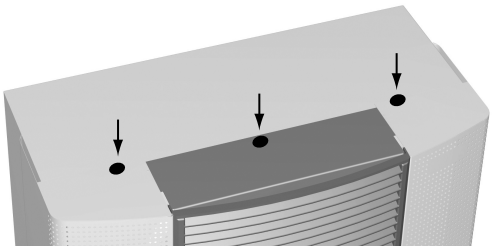


Figure 12. Secure the cover

4.4.4.6 Install the cover

1. Hook the cover at the front edge on the front cover.

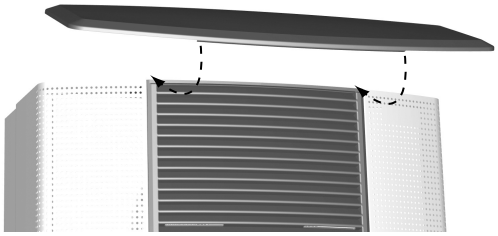


Figure 13. Hook the front cover into place

1. Secure the cover using a screw on each side. Use 2 x cross head screws.

If the cover does not align with the side cover plates it may be necessary to drill new 3 mm holes:

- Mark for the new holes
- Lift off the cover
- Drill the holes
- Install and screw the cover into place

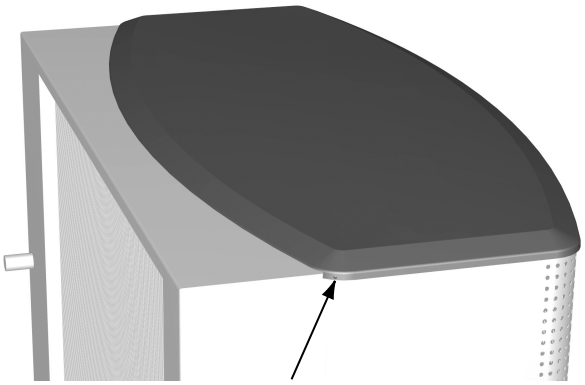


Figure 14. Screw the front cover into place

4.4.4.7 Install cover

1. Hook the cover onto the stand.

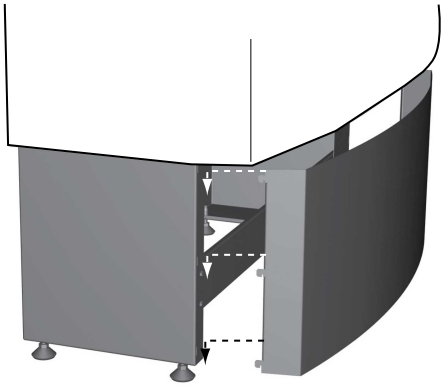


Figure 15. Hook the cover onto the stand.

5 Piping installation

Warning! As the water temperature in DHP-H Opti Pro and DHP-L Opti Pro becomes extremely hot, a mixer valve must be installed between the cold water and hot water pipes to ensure a lower domestic hot water temperature.Alternatively the maximum hot water temperature must be reduced in the Service menu.

Warning! Danfoss SP (1-phase) heat pumps have a factory installed safety valve for temperature and pressure, (10 bar 90-95°C), in accordance with the requirements in Great Britain. This valve is located in the water tank and may not be used for any purpose other than connecting the outlet pipe.
Also note that for heat pump DHP-H Opti Pro SP and DHP-L Opti Pro SP it is imperative that the hot water temperature is changed from default setting 95°C to 85°C.

Caution! Piping installation must be carried out in accordance with applicable local rules and regulations. The hot water tank must be equipped with an approved safety valve.

Caution! To prevent leaks, ensure that there are no stresses in the connecting pipes!

Caution! It is important that the heating system is bled after installation. Bleed valves must be installed where necessary.

Note! Ensure that the pipe installation is carried out in accordance with the dimensions and connection diagrams.

Note! Configure the heat pump for the desired system solution in the SERVICE\ADD. HEATER\EXTERNAL ADDITION menu.

5.1 Safety valves

Caution! Radiator systems with a closed expansion tank must also be equipped with an approved pressure gauge and safety valve, minimum DN 20, 1.5 bar opening pressure, or according to country specific requirements.

Caution! Cold and hot water pipes and overflow pipes from safety valves must be made of heat resistant and corrosion-resistant material, e.g. copper. The safety valve overflow pipes must have an open connection to the drain and visibly flow into this in a frost-free environment.

Caution! The connecting pipe between the expansion tank and the safety valve must slope continuously upwards. A continuous upwards slope means that the pipe must not slope downwards from the horizontal at any point.

5.2 Connection heat transfer fluid

5.2.1 System solution 1

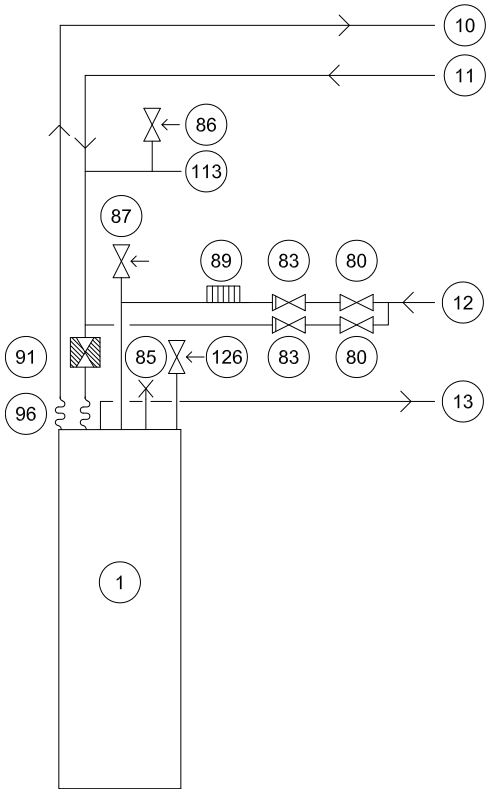
In system solution 1 the heat pump can produce both heating and hot water with the compressor and the integrated auxiliary heater. Production of heating and hot water cannot occur at the same time because the exchange valve for heating/hot water is positioned after the auxiliary heater.

The integrated auxiliary heater carries out peak heating charging (antilegionella function) in those operating modes that permit auxiliary heat.

For system solution 1, select the factory setting in menu SERVICE\AUX. HEATER\EXTERNAL ADDITION:
EXTERNAL AUX. HEATER = 0 (Off)
REV.V. HOT WATER = INT

5.2.1.1 Example system solution 1

System solution for DHP-H, DHP-H Opti, DHP-H Opti Pro, DHP-C, DHP-A, DHP-A Opti.



Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
126	Safety valve for temperature and pressure (only applies to certain models)

Figure 16. Example system solution 1

5.2.1.2 Example system solution 1

System solution for DHP-L, DHP-L Opti

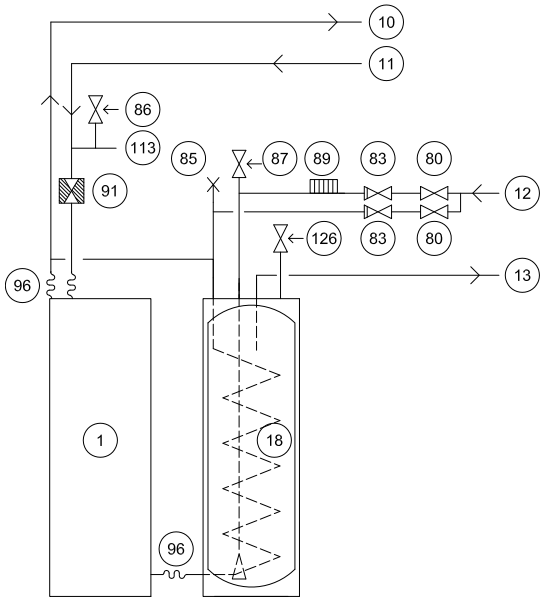


Figure 17. Example system solution 1

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
18	Water heater
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.1.3 Example system solution 1

System solution for DHP-L Opti Pro.

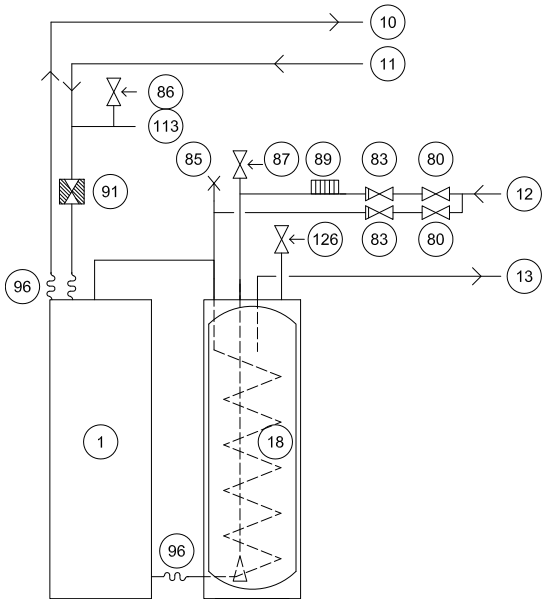


Figure 18. Example system solution 1

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
18	Water heater
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.1.4 Example system solution 1

System solution for DHP-AL, DHP-AL Opti.

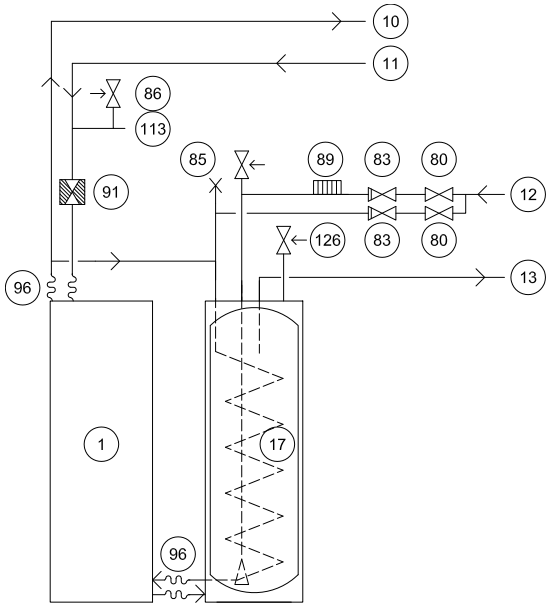


Figure 19. Example system solution 1

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
17	Water heater (DHP-AL)
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.2 System solution 2

In system solution 2, the heat pump can produce both heat and hot water and an external auxiliary heater (oil boiler, electric boiler, district heating or similar) supports heat production but not hot water production. The exchange valve for heating/hot water is located ahead of the external auxiliary heater, which allows the production of heating and hot water at the same time.

The integrated auxiliary heater can be used for heating and hot water production as well as for antilegionella. The values of the integrals, A2 and A3 are used to select if the external auxiliary heater is to step in before or after the integrated electrical auxiliary heater.

The heat pump control computer also controls an additional shunt located after the external addition.

For system solution 2, select in menu SERVICE\AUX. HEATER\EXTERNAL ADDITION:

EXT.AUX.HEATER = ON

REV.V. HOT WATER = INT

5.2.2.1 Example system solution 2

System solution for DHP-H, DHP-H Opti, DHP-H Opti Pro, DHP-C, DHP-A, DHP-A Opti.

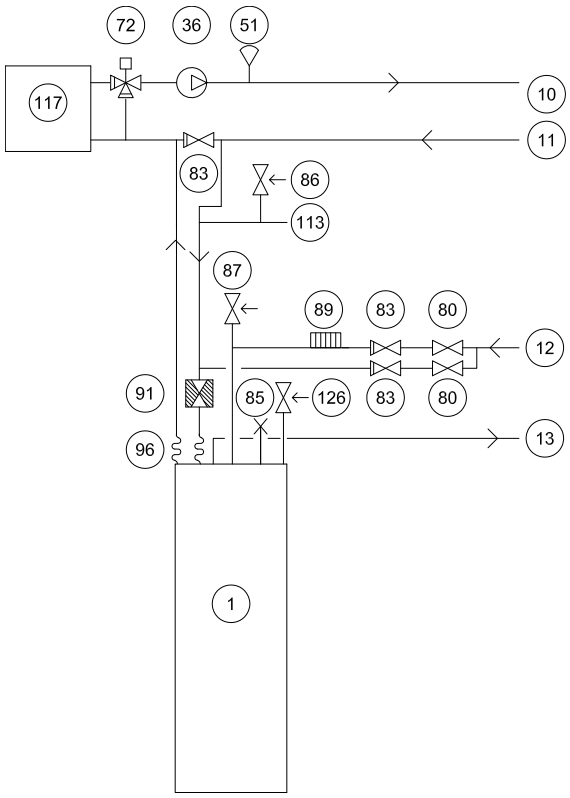


Figure 20. Example system solution 2

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
36	Circulation pump
51	Supply line sensor, moved out from heat pump
72	Additional shunt
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
117	External auxiliary heater
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.2.2 Example system solution 2

System solution for DHP-L, DHP-L Opti.

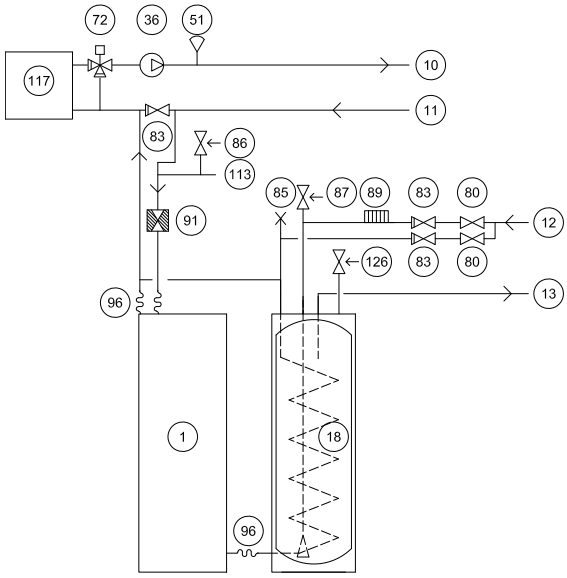


Figure 21. Example system solution 2

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
18	Water heater
36	Circulation pump
51	Supply line sensor, moved out from heat pump
72	Additional shunt
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
117	External auxiliary heater
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.2.3 Example system solution 2

System solution 2 for DHP-L Opti Pro.

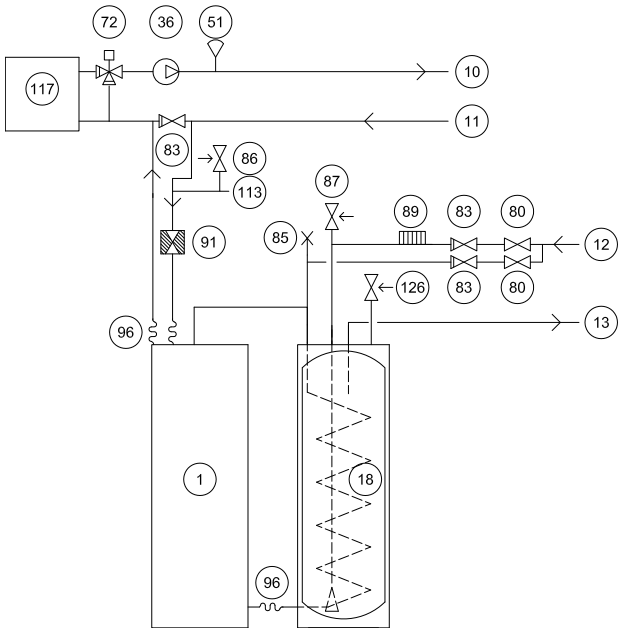


Figure 22. Example system solution 2

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
18	Water heater
36	Circulation pump
51	Supply line sensor, moved out from heat pump
72	Additional shunt
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
117	External auxiliary heater
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.2.4 Example system solution 2

System solution for DHP-AL, DHP-AL Opti.

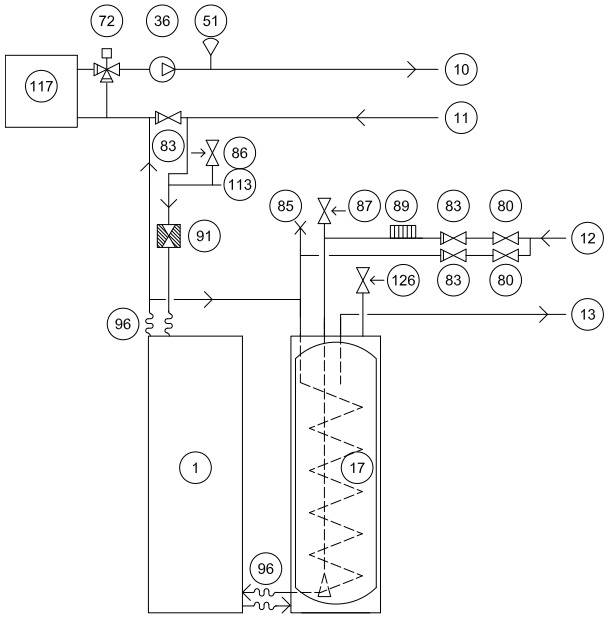


Figure 23. Example system solution 2

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
17	Water heater (DHP-AL)
36	Circulation pump
51	Supply line sensor, moved out from heat pump
72	Additional shunt
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
117	External auxiliary heater
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.3 System solution 3

In system solution 3, the heat pump can produce both heat and hot water and an external auxiliary heater (oil boiler, district heating or similar) supports heat and hot water production and can support antilegionella. The exchange valve for heating/hot water is located after the external auxiliary heater, which prevents the production of heating and hot water at the same time.
The integrated auxiliary heater can be used for heating and hot water production as well as for antilegionella.
The parameter "TOPH.AUX" is used to determine if the external or internal auxiliary heater produces antilegionella.
The values of the integrals, A2 and A3 are used to select if the external auxiliary heater is to step in before or after the integrated electrical auxiliary heater.
The heat pump control computer also controls an additional shunt located after the external addition.
For system solution 3, select in menu SERVICE\AUX. HEATER\EXTERNAL ADDITION:
EXT.AUX.HEATER = ON
REV.V. HOT WATER = EXT

5.2.3.1 Example system solution 3

System solution for DHP-H, DHP-H Opti, DHP-C, DHP-A, DHP-A Opti.

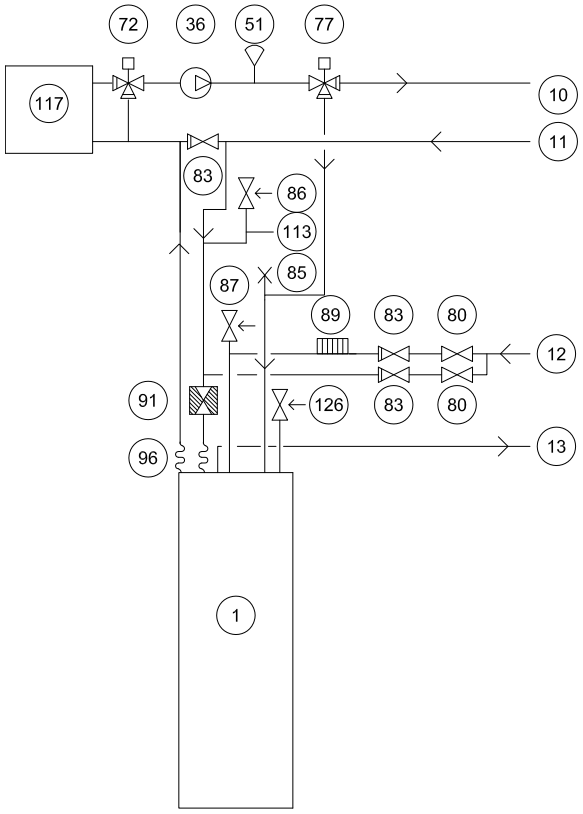


Figure 24. Example system solution 3

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
36	Circulation pump
51	Supply line sensor, moved out from heat pump
72	Additional shunt
77	Reversing valve
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
117	External auxiliary heater
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.3.2 Example system solution 3

System solution for DHP-L, DHP-L Opti.

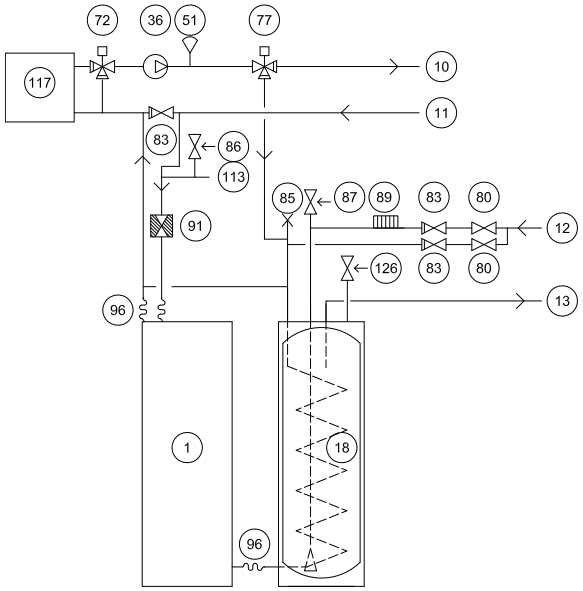


Figure 25. Example system solution 3

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
18	Water heater
36	Circulation pump
51	Supply line sensor, moved out from heat pump
72	Additional shunt
77	Reversing valve
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
117	External auxiliary heater
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.3.3 Example system solution 3

System solution for DHP-AL, DHP-AL Opti.

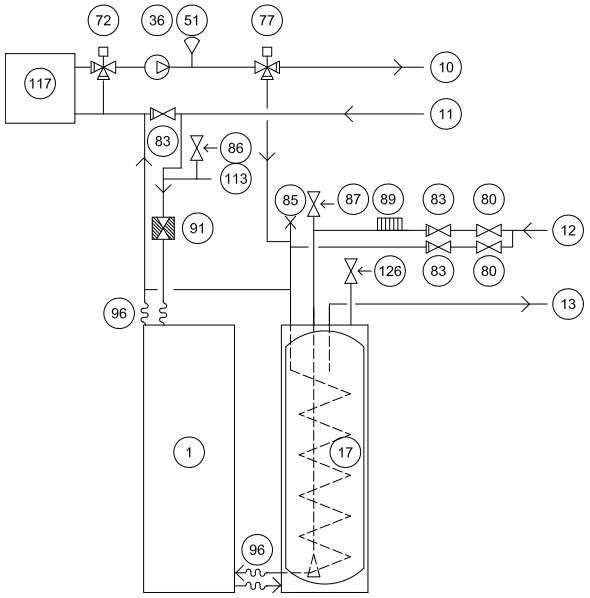


Figure 26. Example system solution 3

Symbol explanation

1	Heat pump
10	Supply line
11	Return line
12	Cold water
13	Hot-water
17	Water heater (DHP-AL)
36	Circulation pump
51	Supply line sensor, moved out from heat pump
72	Additional shunt
77	Reversing valve
80	Shut-off valve
83	Non-return valve
85	Venting valve
86	Safety valve expansion heating system
87	Safety valve cold water 9 bar
89	Vacuum valve
91	Strainer
96	Flexible hose
113	Expansion heating system
117	External auxiliary heater
126	Safety valve for temperature and pressure (only applies to certain models)

5.2.4 Connecting cold and hot water lines

1. Connect the cold water and hot water pipes with all the necessary components according to the connection diagram for the relevant system.

5.2.5 Connecting the heating system supply and return lines

For information on how flexible hoses should be installed, see Flexible hoses.

1. Connect the supply pipe with a flexible hose connection and with all the necessary components.
2. Connect the return pipe with a flexible hose connection and with all the necessary components including a filter.
3. Insulate the supply and return lines.
4. Connect the bleed valve to the outlet (22mm Cu) on the top of the heat pump.

5.3 Connection brine

5.3.1 Connection brine DHP-H, DHP-H Opti, DHP-H Opti Pro, DHP-L, DHP-L Opti, DHP-L Opti Pro

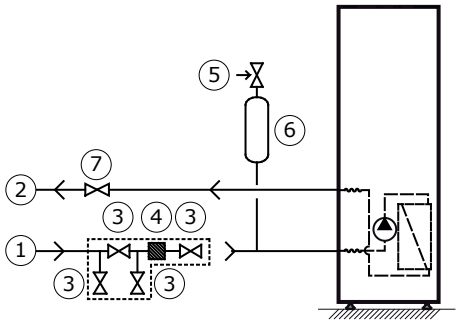


Figure 27. General connection diagram brine lines

Symbol explanation

1	Brine in
2	Brine out
3	Shut-off valve (part of the filler cock)
4	Dirt valve
5	Safety valve (1.5 bar)
6	Bleed and expansion tank
7	Shut-off valve

5.3.2 Connection brine DHP-C

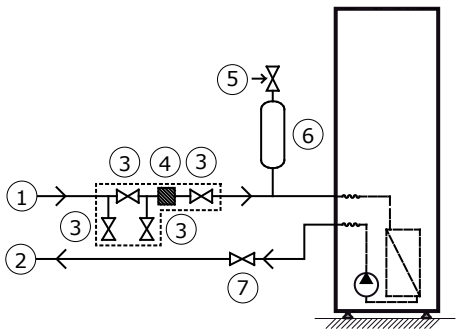


Figure 28. General connection diagram brine lines

Symbol explanation

1	Brine in
2	Brine out
3	Shut-off valve (part of the filler cock)
4	Strainer
5	Safety valve (1.5 bar)
6	Bleed and expansion tank
7	Shut-off valve

5.3.3 Connection brine DHP-A, DHP-A Opti

If the outdoor unit is installed higher than the heat pump a pressure tank with safety valve must be connected to the outlet for bleeding.

If the outdoor unit is installed at the same level or lower than the heat pump, the accompanying plastic vessel can be used. The upper part of the outdoor unit must then not exceed the fluid level in the vessel.

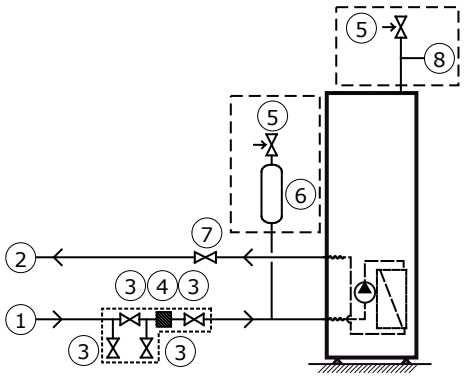
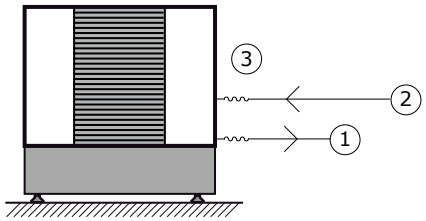


Figure 29. General connection diagram, brine lines

Symbol explanation

1	Brine in
2	Brine out
3	Shut-off valve (part of the filler cock)
4	Strainer
5	Safety valve (1.5 bar)
6	Bleed and expansion tank
7	Shut-off valve
8	Pressure tank

5.3.3.1 Connection brine Outdoor unit DHP-A, DHP-A Opti



Symbol explanation

1	Brine out
2	Brine in
3	Flexible hoses

Figure 30. General connection diagram, brine lines

5.3.4 Connecting brine DHP-AL, DHP-AL Opti

If the outdoor unit is installed higher than the heat pump a pressure tank with safety valve must be connected to the outlet for bleeding.

If the outdoor unit is installed at the same level or lower than the heat pump, the accompanying plastic vessel can be used. The upper part of the outdoor unit must then not exceed the fluid level in the vessel.

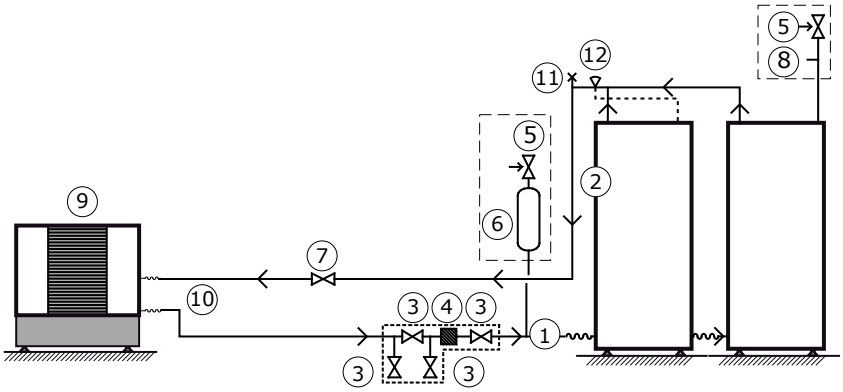


Figure 31. General connection diagram, brine lines

Symbol explanation

1	Brine in	7	Shut-off valve
2	Brine out	8	Pressure tank
3	Shut-off valve (part of the filler cock)	9	Outdoor unit
4	Strainer (part of the filler cock)	10	Flexible hoses
5	Safety valve (1.5 bar)	11	Bleed valve
6	Bleed and expansion tank	12	Moved out supply line sensor, brine

5.3.5 Drilling holes for brine pipes

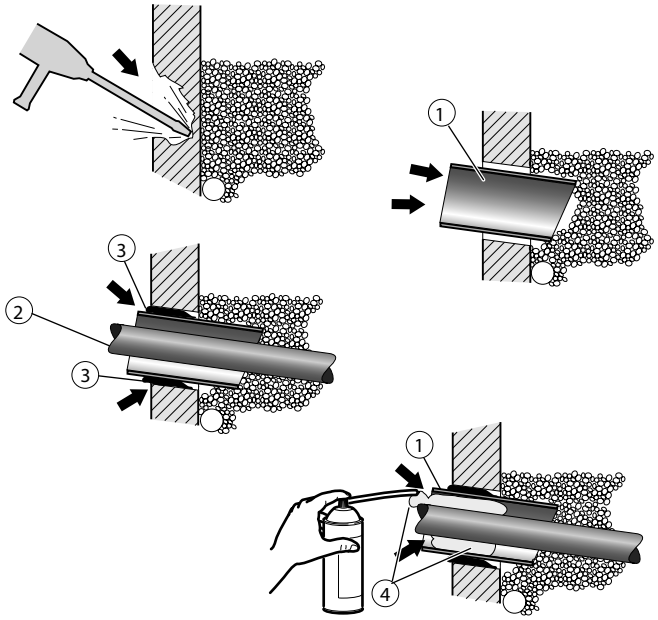
Caution! Ensure that the holes for the insert pipes are positioned so that there is room for the other installations.

Caution! The brine pipes shall have separate lead-ins. If the wall lead-ins are below the highest ground water level watertight lead-ins must be used.

The brine pipes must be insulated from the heat pump, through the walls and outside the house all the way to the collector so as to avoid condensation and prevent heat loss.

If the brine pipes are to be routed above ground, drill holes in the walls for them.

If the brine pipes are to be routed below ground see the instructions below.



Symbol explanation

1	Insert pipe
2	Brine pipe
3	Mortar
4	Sealant

Figure 32. Making holes

1. Drill holes in the wall for the insert pipes (1) for the brine pipes. Follow the dimension and connection diagrams. If there is any risk of groundwater infiltration at brine pipe lead-ins, watertight grommets must be used.
2. Position the insert pipes (1) in the holes sloping downwards. The inclination must be at least 1cm every 30cm. Cut them at an angle (as illustrated) so that rain water cannot get into the pipes.
3. Insert the brine pipes (2) into the insert pipes in the installation room.
4. Fill in the holes around the lines with mortar (3).
5. Ensure that the brine pipes (2) are centred in the insert pipes (1) so that the insulation is distributed equally on all sides.
6. Seal the insert pipes (1) with a suitable sealant (foam) (4).

5.3.6 Installing brine pipes

1. Determine to which side the brine pipes are to be connected.
2. Route the out pipe for brine in through the corresponding hole (with rubber collar) in the heat pump side.
3. Install all necessary components on the pipe. Remember to install the filler cock with the filter cover upwards.
4. Route the pipe for brine out through the corresponding hole (with rubber collar) in the heat pump side.

Caution! When the brine lines are connected to the right for DHP-A, the brine out line must be routed over the brine pump, under the compressor's vacuum pipe and under the condenser's flexible hose, see figure below.

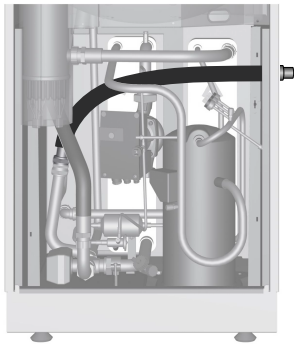


Figure 33. The brine's supply line

1. Install the out pipe with all the accompanying components.
2. Install the expansion tank with the safety valve.
3. Fit both brine pipes with anti-diffusion insulation running all the way from the heat pump to the lead-in in the wall. The brine pipes running outside the house to the collector can be buried, however they must be well insulated.

Caution! Applies to DHP-A:Bear in mind that the outdoor unit may move during defrosts, use flexible hoses to connect the pipes from the heat pump and pipes on the outdoor unit.

5.3.7 Connection to outdoor unit

Connection for the brine circuit from the heat pump to the outdoor unit can be carried out using pipes or hoses. Depending on what connection is selected and what diameter the connection has, there is a maximum length that the connection may be. The maximum lengths in the table below are based on ethylene glycol (which is mixed to anti-freeze protection down to -32±1°C) at 0°C.

Table 1. Max coil length between heat pump and outdoor unit

DHP-A, DHP-AL	Ext.avail. press.	Calculated maximum coil length between the HP and outdoor unit, in metres			
Size	kPa	Cu22 Øi = 20.0	Cu28 Øi = 25.6	PEM DN 25 Øi = 21.0	PEM DN 32 Øi = 28.0
6	30	34 (2 x 17)	133 (2 x 66.5)	48 (2 x 24)	173 (2 x 86.5)
8	63	21 (2 x 10.5)	98 (2 x 49)	30 (2 x 15)	150 (2 x 75)
10	50	11 * (2 x 5.5)	47 (2 x 23.5)	13 * (2 x 6.5)	78 (2 x 39)
12	43	5 * (2 x 2.5)	26 (2 x 13)	8 * (2 x 4)	44 (2 x 22)

*) Not recommended because of high liquid speeds with risk of corrosion/noise problems.

5.4 Noise information

5.4.1 Flexible hoses

Caution! The press sleeves may never be used as a counterhold when tightening connections.

All pipes should be routed in such a way that vibrations cannot be transmitted from the heat pump through the piping and out into the building. This also applies to the expansion pipe. We recommend that flexible hoses are

used for all pipe connections to avoid the transmission of vibrations. Flexible hoses are available to purchase as accessories. The figures below show how appropriate and inappropriate installations look using this type of hose.

To avoid noise caused by pipe mounting, a rubber-coated pipe clamp should be used to prevent the transmission of vibrations. However, installation should not be too rigid and the pipe clamp must not be too tight.

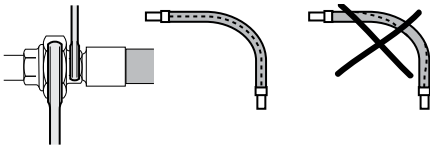


Figure 34. Do not twist the flexible hoses as they are installed. At threaded connections, use a counterhold spanner

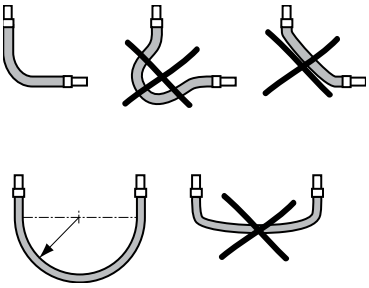


Figure 35. Cut the hose to the correct length to avoid excess bowing-out or stretching at bends.

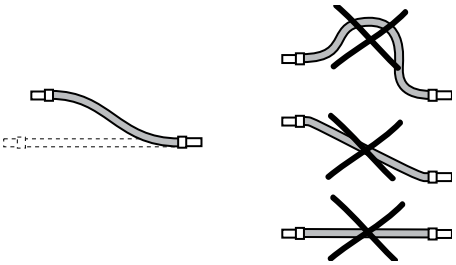


Figure 36. Cut the hose to the correct length to avoid excess bowing-out or stretching and offset the ends so that the hose is installed completely straight.

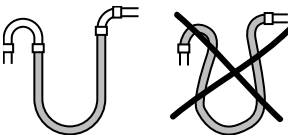


Figure 37. Use fixed pipe bends to avoid excess stress on bends next to connections

6 Electrical Installation

DANGER! Electrical voltage! The terminal blocks are live and can be highly dangerous due to the risk of electric shock. All power supplies must be isolated before electrical installation is started. The heat pump is connected internally at the factory, for this reason electrical installation consists mainly of the connection of the power supply.

Caution! Electrical installation may only be carried out by an authorized electrician and must follow applicable local and national regulations.

Caution! The electrical installation must be carried out using permanently routed cables. It must be possible to isolate the power supply using an all-pole circuit breaker with a minimum contact gap of 3 mm. (The maximum load for externally connected units is 2A).

6.1 Electrical components

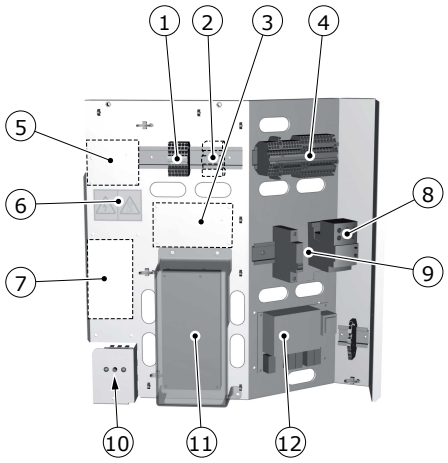


Figure 38. The location of the components on the electrical panel

Symbol explanation

1	Terminal block (applies to the expansion card)
2	Terminal block (applies to DHP-A)
3	Defrost card (applies to DHP-A)
4	Terminal block
5	Space for Danfoss Online
6	Warning decal
7	Space for expansion card
8	Motor protection for compressor
9	Automatic fuses
10	Resetting overheating protection
11	Control computer
12	Soft starter card

6.2 Fuse size

DHP-H, DHP-H Opti, DHP-H Opti Pro, DHP-L, DHP-L Opti, DHP-L Opti Pro

		4 kW	6 kW	8 kW	10 kW	12 kW	16 kW
400V, 3-N	A	$16^{8}/10^{1}/10^{2}/16^{3}$	$10^{1}/16^{2}/20^{3}$	$16^{1}/16^{2}/20^{3}$	$16^{1}/16^{2}/20^{3}$	$16^{1}/20^{2}/25^{3}$	$20^{1}/20^{2}/25^{3}$
230V, 1-N	A	$20^{1}/25^{2}/32^{3}$	$25^{1}/32^{2}/40^{3}$	$25^{1}/32^{2}/40^{3}$	$32^{1}/40^{2}/50^{3}$	$32^{1}/40^{2}/50^{3}$	-

DHP-C

		6 kW	8 kW	10 kW	4 H	5 H	7 H
400V, 3-N	A	$10^{1}/16^{2}/20^{3}$	$16^{1}/16^{2}/20^{3}$	$16^{1}/16^{2}/20^{3}$	$10^{1}/16^{2}/20^{3}$	$16^{1}/16^{2}/20^{3}$	$16^{1}/16^{2}/20^{3}$

		6 kW	8 kW	10 kW	12 kW
400V, 3-N	A	10[1]/16[2]/20[3]/20[4]/ 25[5]/25[6]/30[7]	16[1]/16[2]/20[3]/20[4]/ 25[5]/25[6]/30[7]	16[1]/16[2]/20[3]/20[4]/ 25[5]/30[6]/35[7]	16[1]/20[2]/25[3]/25[4]/ 25[5]/30[6]/35[7]
230V, 1-N	A	25[1]/32[2]/40[3]	25[1]/32[2]/40[3]	32[1]/40[2]/50[3]	32[1]/40[2]/50[3]

1. Heat pump with 3 kW immersion heater (1-N 1.5 kW).
2. Heat pump with 6 kW immersion heater (1-N 3 kW).
3. Heat pump with 9 kW immersion heater (1-N 4.5 kW).
4. Heat pump with 12 kW immersion heater and shut off compressor
5. Heat pump with 15 kW immersion heater and shut off compressor
6. Heat pump with 12 kW immersion heater
7. Heat pump with 15 kW immersion heater
8. Fuse phase L1 (size 4 has 1-phase compressor)

6.3 Connecting external supply voltage

DANGER! Electrical voltage! The power cable may only be connected to the terminal block intended for this purpose. No other terminal blocks may be used!

1. Route the power cable through the opening in the top panel of the heat pump to the terminal blocks.
2. Connect the power cable as follows.

6.3.1 Connection 400 V, 3-N

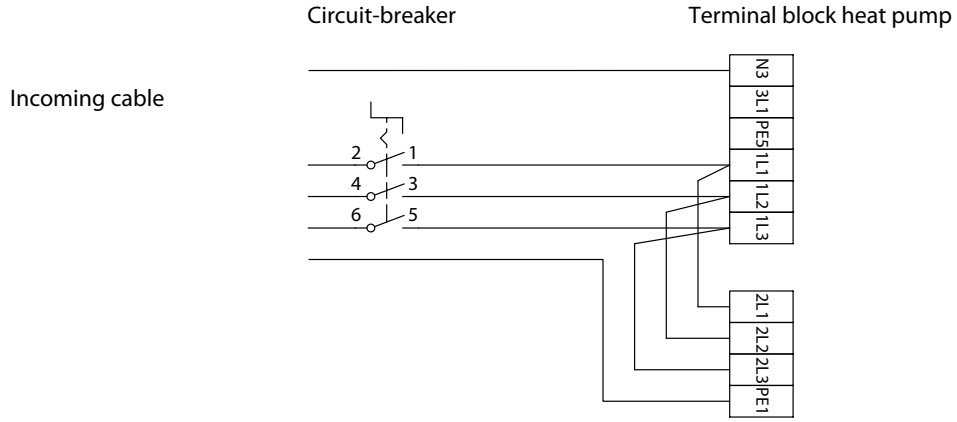


Figure 39. Connection 400V 3N

6.3.2 Connection 230 V, 1-N

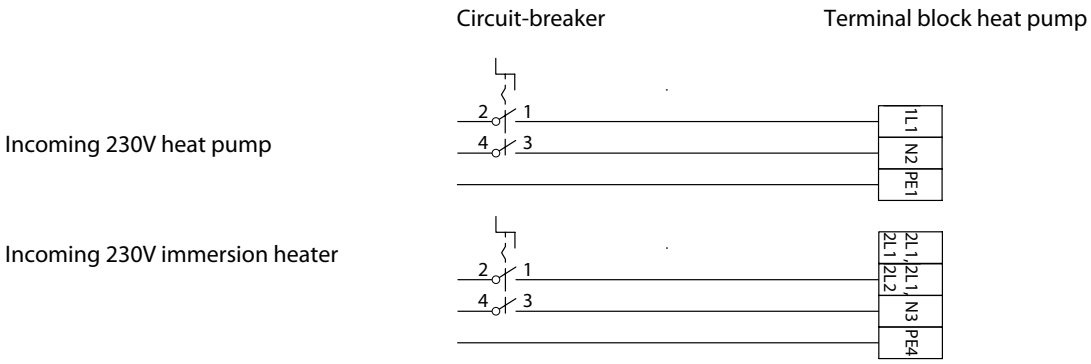
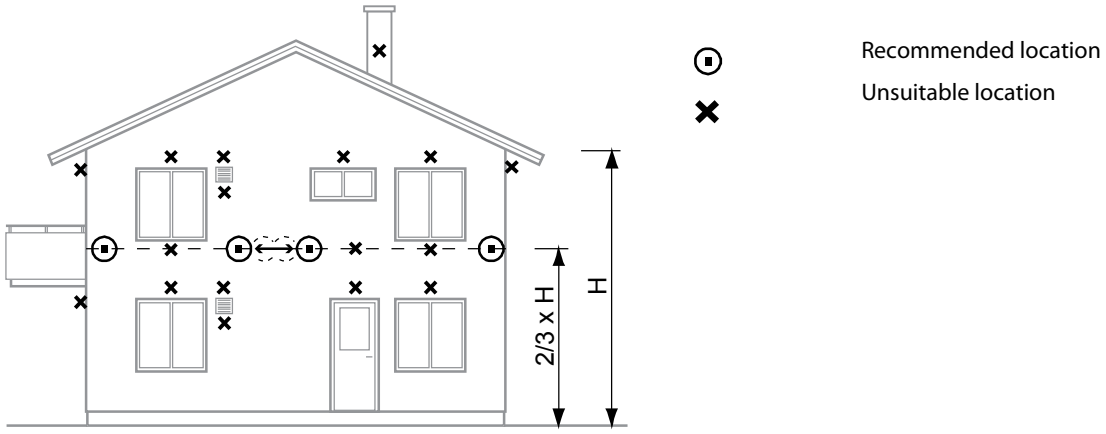


Figure 40. Connection 230V 1N

6.3.3 Connection 230 V, 3-P

See country specific electrical instructions.

6.4 Position and connect outdoor sensors



- Position the outdoor sensor on the north or north west side of the house.
- For higher buildings, the sensor should be positioned between the second and third storeys. Its location must not be completely protected from the wind but not in a direct draft. The outdoor sensor should not be placed on reflective panel walls.
- The sensor must be positioned at least 1 m from openings in the walls that emit hot air.
- If the sensor cable is connected through a pipe, the pipe must be sealed so that the sensor is not affected by outgoing air.

The outdoor sensor is connected by a two core cable. A maximum cable length of 50 m applies for a cross section of 0.75 mm2. For greater lengths a cross section of 1.5 mm2 is used, up to a maximum of 120 m.
Then connect the sensor to the heat pump's control system.

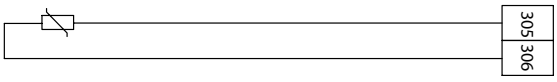
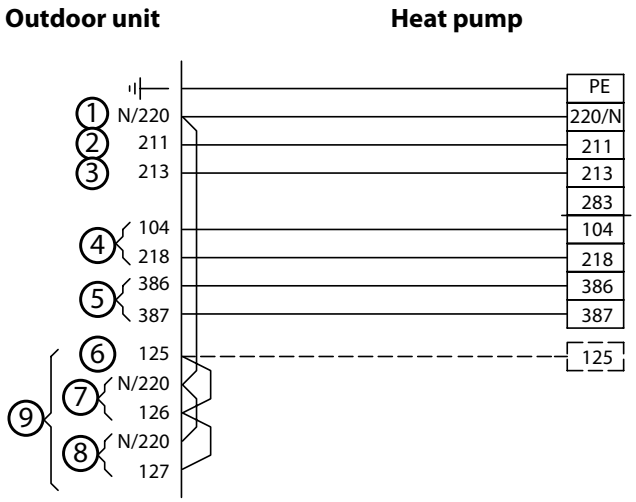


Figure 41. Connection outdoor sensor

6.5 Connect outdoor unit, DHP-A, DHP-AL

Caution! The power cable may only be connected to the terminal block intended for this purpose. No other terminal blocks may be used!

1. Route the power cable through the opening in the top panel of the heat pump to the terminal blocks.
2. Connect the power cable to the terminal block.



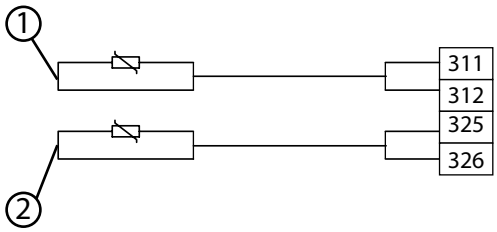
Symbol explanation

1	Neutral
2	Fan high speed
3	Fan low speed
4	Motor protection fan
5	Defrost sensor
6	Accessories
7	Heating, drip tray
8	Heating cable
9	Accessories

Figure 42. Connection outdoor unit

6.6 Connect temperature sensor hot water, DHP-L

Sensor for hot water and hot water peak from external water heater is connected in the following way to DHP-L, DHP-L Opti, DHP-L Opti Pro.



Symbol explanation

1. Sensor hot-water
2. Sensor hot-water top

Figure 43. Connection temperature sensor hot water

6.7 Changing the language in the control computer

If necessary, change the language in the control computer menu system

1. Ensure that the main circuit breaker is on.
2. Open the INFORMATION menu.
3. Change language in the control computer menu INFORMATION -> LANGUAGE - ENGLISH, select language with + or -.

6.8 Selection of system solution and connection of external aux. heater

Note! Configure the heat pump for the desired system solution in the SERVICE\ADD. HEATER\EXTERNAL ADDITION menu.

Also see section Piping installation and Menyinformation.

6.8.1 System solution 1

The heat pump is delivered configured for system solution 1.

6.8.2 System solution 2

Note! If necessary the external components must be fused using accessory 086U9685 FUSE TO EXTERNAL COMPONENT according to the installation instructions supplied with the accessory. The tables below give the components referred to.

For system solution 2, select the following in menu SERVICE\AUX. HEATER\EXTERNAL ADDITION:

- EXT.AUX.HEATER = ON
- REV.V. HOT WATER = INT

For DHP-H, DHP-H Opti, DHP-H Opti Pro, DHP-C the electrical connection for system solution 2 must be carried out according to the following table:

Table 2. Electrical connection

Component	Connection
Internal auxiliary heater	I/O-card, output for 6 kW (normal connection)
External auxiliary heater	I/O-card, output for 3 kW, connected and fused with 086U9685
Additional shunt	Terminal block, 215/216
Internal exchange valve	I/O-card, 214 (normal connection)

For DHP-L, DHP-L Opti, DHP-L Opti Pro the electrical connection for system solution 2 must be carried out according to the following table:

Table 3. Electrical connection

Component	Connection
Internal auxiliary heater	I/O-card, output for 6 kW (normal connection)
External auxiliary heater	Terminal block 210, connected and fused with 086U9685
Additional shunt	Terminal block, 215/216
Internal exchange valve	I/O-card, 214 (normal connection)

For DHP-A, DHP-A Opti, DHP-AL, DHP-AL Opti the electrical connection for system solution 2 must be carried out according to the following table:

Table 4. Electrical connection

Component	Connection
Internal auxiliary heater	I/O-card, output for 3 kW and 6 kW as well as Defrost card, output for 6 kW (normal connections)
External auxiliary heater	Defrost card; 283, connected and fused with 086U9685
Additional shunt	Terminal block, 215/216
Internal exchange valve	I/O-card, 214 (normal connection)

6.8.3 System solution 3

Note! If necessary the external components must be fused using accessory 086U9685 FUSE TO EXTERNAL COMPONENT according to the installation instructions supplied with the accessory. The tables below give the components referred to.

For system solution 3, select the following in menu SERVICE\AUX. HEATER\EXTERNAL ADDITION:

- EXT.AUX.HEATER = ON
- REV.V. HOT WATER = EXT

For DHP-H, DHP-H Opti, DHP-C the electrical connection for system solution 3 must be carried out according to the following table

Table 5. Electrical connection

Component	Connection
Internal auxiliary heater	I/O-card, output for 6 kW (normal connection)
External auxiliary heater	I/O-card, output for 3 kW, connected and fused with 086U9685
Additional shunt	Terminal block, 215/216
External exchange valve	I/O-card, 214 kW, connected and fused with 086U9685

For DHP-L, DHP-L Opti the electrical connection for system solution 3 must be carried out according to the following table:

Table 6. Electrical connection

Component	Connection
Internal auxiliary heater	I/O-card, output for 6 kW (normal connection)
External auxiliary heater	Terminal block 210, connected and fused with 086U9685
Additional shunt	Terminal block, 215/216
External exchange valve	I/O-card, 214 kW, connected and fused with 086U9685

For DHP-A, DHP-A Opti, DHP-AL, DHP-AL Opti the electrical connection for system solution 3 must be carried out according to the following table:

Table 7. Electrical connection

Component	Connection
Internal auxiliary heater	I/O-card, output for 3 kW and 6 kW as well as Defrost card, output for 6 kW (normal connections)
External auxiliary heater	Defrost card; 283, connected and fused with 086U9685
Additional shunt	Terminal block, 215/216
External exchange valve	I/O-card, 214 kW, connected and fused with 086U9685

For system solution 3, the heat pump's integrated exchange valve must be limited in open mode to the heating system.

To limit the direction of flow for the exchange valve for the heating system, carry out the following steps:

1. Check that the main circuit breaker is on.
2. Open the SERVICE menu by pressing and holding the left button in for five seconds.
3. Open the control computer menu SERVICE -> MANUAL TEST.
4. Set the value for MANUAL TEST to 1.
5. Set the value for REV.V. HOT WATER to 0.
6. Wait at least 15 seconds, disconnect the quick connector at the exchange valve.
7. Set the value for MANUAL TEST back to 0.
8. Connect the external exchange valve cables according to the tables above.
9. Move the supply line sensor out to the position shown in the diagram for System solution 3.

6.9 Changing the number of auxiliary heating power stages

Caution! Setting the maximum permitted number of power stages for the auxiliary heating must be carried out.

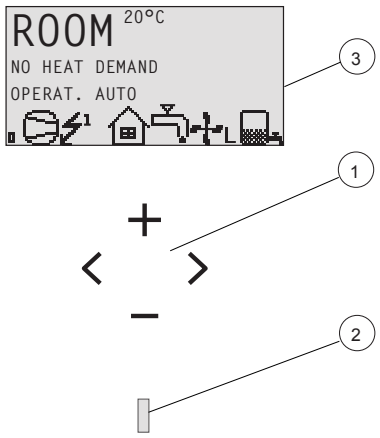
1. Ensure that the main circuit breaker is on.
2. Open the SERVICE menu by pressing and holding in for five seconds.
3. Change the number of auxiliary heating power stages in the control system's menu SERVICE -> AUX.HEAT -> MAXSTEP, select the number of stages using **+** and **-**.

7 Menu information

Menu description regards software with version 1.3.
The heat pump has an integrated control system which automatically calculates the heat demand in the house to ensure that the correct amount of heat is produced and emitted where necessary.

The control panel is operated using a keypad and information is shown in a display and by an indicator.

Note! The information in the display and menus will vary depending on the heat pump model and connected accessories.



1. Keypad
2. Indicator
3. Display

\+ Plus sign used to scroll up a menu and increase the values.

\- Minus sign used to scroll down a menu and reduce the values.

> Right arrow used to select a value or open a menu.

< Left arrow to cancel selection or exit a menu.

The indicator at the bottom of the control panel has three modes:

- Not lit, means that the heat pump is not powered.
- When the green light shines continuously, the heat pump has power and is ready to produce heat or hot water.
- Flashing green, means an active alarm.

Caution! During a service that consists of replacing the display card, all heat pump settings are reset to factory settings. Therefore note current settings before replacement.

The control system is divided into the following two main menus:

- INFORMATION
- SERVICE

The INFORMATION menu is opened by pressing the left or right buttons.

For installation and service, the SERVICE menu is used, which is opened by pressing the left button for at least five seconds.

8 INFORMATION menu

Open the menu by pressing the left or right button. The menu also shows history and operating times.

Note! The menu information below describes all possible parameters. The parameters that appear in the display vary depending on the selections made in menus (e.g. type of heat pump) and on the connected hardware (e.g. expansion card and defrost card).

Table 8. Used to change the heat pump's operating modes and to adjust the heat curve.

Menu	Sub menu	Sub menu	Sub menu
INFORMATION			
	OPERAT.		
		Ø	**CANCEL** **Ø**
		AUTO **HEAT PUMP** **AUX. HEATER** **HOT WATER** **MANUAL TEST**	
	HEAT CURVE		
		CURVE **MIN** **MAX** **CURVE 5** **CURVE 0** **CURVE -5** **HEAT STOP** **REDUCTION** **TANK TEMP** **OVERCHARGE** **ROOM FACTOR** **POOL** **POOL HYSTERESIS**	
	HEAT CURVE 2 (if shunt group is activated)		
		CURVE **MIN** **MAX**	
	TEMPERATURE		
		OUTDOOR **ROOM** **SYSTEM SUPPLY** **SUPPLY LINE** **RETURN LINE** **BUFFER TANK** **HOT WATER** **INTEGRAL** **BRINE IN** **BRINE OUT** **POOL** **COOLING** **SHUNT GROUP** **2ND HEAT CIR.** **CURRENT**	
	OPERAT. TIME		

Menu	Sub menu	Sub menu	Sub menu
		HEAT PUMP **AUX. HEAT 1** **AUX. HEAT 2** **AUX. HEAT 3** **HOT WATER** **COOLING** **ACT COOLING**	
	DEFROST		
		DEFROSTS **BETW. 2 DEFR** **TIME LAST DEFR** **FAN H OFF AT** **DEFROST CURVE** **MANUAL DEFR**	
	LANGUAGE		
		SVENSKA **ENGLISH** **DEUTSCH** **NEDERLANDS** **FRANÇAIS** **ESPAÑOL** **ITALIANO** **NORSK** **DANSK** **SUOMI** **EESTI** **POLSKI** **ČEŠTINA**	

8.1 Sub-menu OPERAT.

Table 9. Used to select operating mode.

Menu selection	Meaning	Factory setting
⏻ **(OFF)**	The installation is fully switched off. This mode is also used to acknowledge certain alarms. CANCEL = starting point, no changes made. To select OFF as operating mode, press the minus sign once to scroll down one step and press the right arrow once.	-
AUTO	Automatic operation with both heat pump and auxiliary heater permitted. If the number of power stages for auxiliary heating are set to zero (SERVICE -> AUX. HEATER -> MAX STEP) only AUTO or OFF can be selected as operating mode.	-
HEAT PUMP	Operation with only heat pump permitted. Note! No peak heating charging (anti-legionella function) with only heat pump operation.	-
AUX. HEATER	Operation with only auxiliary heater permitted.	-
HOT WATER	Operation with heat pump for hot water production and auxiliary heater during peak heating charging (anti-legionella function).	-
MANUAL TEST	Only displayed when the value for MANUAL TEST is set to 2 in The SERVICE menu. Outputs that control components are activated manually.	-

8.2 Sub-menu HEAT CURVE

Table 10. Used to change settings for the heat curve.

Menu selection	Meaning	Factory setting
CURVE	Calculated supply temperature at 0°C outdoor temperature. Shown as a graphic curve. The curve will be limited by the set values of MIN and MAX.	40°C (for under floor heating 30°C) (range: 22°C / 56°C)
MIN	Minimum permitted supply temperature, if the temperature for heat stop has been reached and the heat pump has stopped.	10°C (range: 10°C / 50°C)
MAX	Maximum calculated setpoint value of the supply temperature.	55°C (for under floor heating 45°C) (range: 40°C / 85°C)
CURVE +5	Local increase or reduction of CURVE at an outdoor temperature of +5°C. Shown in the graph for CURVE.	0°C (range: -5°C / 5°C)
CURVE 0	Local increase or reduction of CURVE at an outdoor temperature of 0°C. Shown in the graph for CURVE.	0°C (range: -5°C / 5°C)
CURVE -5	Local increase or reduction of CURVE at an outdoor temperature of -5°C. Shown in the graph for CURVE.	0°C (range: -5°C / 5°C)
HEAT STOP	Maximum outdoor temperature when heat production is permitted. If HEAT STOP applies, the outdoor temperature must drop 3°C below the setting before HEAT STOP stops.	17°C (range: 0°C / 40°C)
REDUCTION	Only appears if the tariff control function has been activated. Lowering set room temperature. Active at 10 kΩ connection at EVU input.	2°C (range: 1°C / 10°C)
TANK TEMP	Displayed if buffer tank is active. Charges the buffer tank to the set temperature. AUTO setting charges the tank to the supply line setpoint value.	AUTO (range: 30°C / 55°C)
OVERCHARGE	Displayed if the buffer tank is active and TANK TEMP is set to AUTO. Charges the buffer tank to supply line setpoint value + the value of OVERCHARGE.	0°C (range: 0°C / 5°C)
ROOM FACTOR	Only displayed if an accessory Room temperature sensor is installed. Determines how great an impact the room temperature is to have when calculating the supply temperature. For under floor heating it is recommended that ROOM FACTOR is set to 1, 2 or 3. For radiator heating it is recommended that ROOM FACTOR is set to 2, 3 or 4.	2 (range: 0 / 4) (0 = no impact, 4 = very large impact)
POOL	Only appears if POOL is selected. The temperature in the pool is controlled by a separate sensor regardless of the heating and hot water system.	20°C (range: 5°C /40°C)
POOL HYSTERESIS	Only appears if POOL is selected. The difference between the desired charge value (adjustable) and actual value to the pool sensor. Pool hysteresis does not affect the integral value.	2°C (range: 1°C / 10°C)

8.3 Sub-menu HEAT CURVE 2

Only appears if shunt group sensor is connected and activated in menu SERVICE -> INSTALLATION -> SYSTEM -> SHUNT GROUP.

Table 11. Used to change settings for heat curve 2.

Menu selection	Meaning	Factory setting
CURVE 2	Calculated shunt group temperature at 0°C outdoor temperature. Shown as a graphic curve. The curve will be limited by the set values of MIN and MAX.	40°C (range: 22°C / 56°C)
MIN	Minimum permitted shunt group temperature, if the temperature for heat stop has not been reached.	10°C (range: 10°C / 50°C)
MAX	Maximum permitted shunt group temperature.	55°C (range: 15°C / 70°C)

8.4 Sub-menu TEMPERATURE

The history of different temperature measurements can be viewed by pressing the right arrow key. The graph shows the last 60 measurement points for the set time interval (SERVICE -> INSTALLATION -> LOG TIME). In the event of an alarm, history stops being logged until the alarm is reset by changing the operating mode to OFF.

Table 12. Used to indicate the prevailing temperatures, history and set/calculated values.

Menu selection	Meaning	Factory setting
OUTDOOR	Shows the actual outdoor temperature.	-
ROOM	Shows the actual set temperature.	-
SYSTEM SUPPLY	Displays system supply temperature at the buffer tank system.	-
SUPPLY LINE	Shows the actual supply temperature. The calculated supply temperature to the heating system group is within brackets. During hot water production in operating mode AUX. HEATER the value for HOT WATER STOP + 10° is shown within brackets.	-
RETURN LINE	Shows the actual return temperature. The stop temperature, MAX RETURN is within brackets.	-
BUFFER TANK	Indicates the buffer tank temperature, if activated.	-
HOT WATER	Indicates actual hot water temperature, if activated.	-
INTEGRAL	Shows the actual calculated value for integral.	-
BRINE IN	Shows the actual temperature for brine in.	-
BRINE OUT	Shows the actual temperature for brine out.	-
POOL	Only appears if POOL is selected. Shows the actual pool temperature. The set pool temperature is shown in brackets.	-
COOLING	Indicates temperature.	
SHUNT GROUP	Only appears if SHUNT GROUP is selected. Shows the actual supply temperature. The calculated supply temperature to the shunt group is within brackets.	-
2ND HEAT CIR.	Shows the temperature of the second heating circuit if installed by the buffer tank system.	
CURRENT	Only appears if CURRENT LIMITER is selected. Shows the actual current consumption. The set value for MAX CURRENT is shown in brackets.	-

8.5 Sub-menu OPERAT.TIME

Table 13. Used to show the operating time for each component. Time given in hours.

Menu selection	Meaning	Factory setting
HEAT PUMP	Compressor operating time for both heating and hot water production.	-
AUX. HEATER	Operating time of auxiliary heater.	-
HOT WATER	Operating time for hot water with compressor.	-

8.6 Sub-menu DEFROST

Table 14. Used to obtain information about defrosting settings and to make defrosting settings.

Menu selection	Meaning	Factory setting
DEFROSTS	Total number of defrosts carried out.	-
BETW. 2 DEFR	The operating time of the compressor in minutes between the two last defrosts.	-
TIME LAST DEFR	The operating time of the compressor in minutes since last defrost.	-

Menu selection	Meaning	Factory setting
FAN H OFF AT	High speed is deactivated at this temperature and low speed is activated.	12°C (range: 10°C / 20°C)
DEFROST CURVE	Used to change the angle of the defrost curve using + or– (Change the start temperature for defrost).	-10°C (range: -13°C / -7°C)
MANUAL DEFR	Used to perform a manual defrost. Started using + or -.	0 (range: 0 / 1)

8.7 Sub-menu LANGUAGE

Table 15. Used to set the language of the menu system.

Menu selection
SVENSKA
ENGLISH
DEUTSCH
NEDERLANDS
FRANÇAIS
ESPAÑOL
ITALIANO
NORSK
DANSK
SUOMI
EESTI
POLSKI
ČEŠTINA

9 SERVICE menu

The SERVICE menu is for use during installation and service to optimise and adjust the operation of the heat pump. Open the menu by pressing the left button for five seconds.

Note! The menu information below describes all possible parameters. The parameters that appear in the display vary depending on the selections made in menus (e.g. type of heat pump) and on the connected hardware (e.g. expansion card and defrost card).

Table 16. Used to change the heat pump's default settings.

Menu	Sub menu	Sub menu	Sub menu	Sub menu
SERVICE				
	HOT WATER			
		START **HOT WATER TIME** **HEATING TIME** **TOPH. INTERVAL** **TOPH. TIME** **TOPH.STOP** **INFL. H.W SENSOR** **WEIGHT HOT WATER**		
	HEAT PUMP			
		INTEGRAL A1 **HYSTERESIS** **MAX RETURN** **START INTERVAL** **ALARM BRINE** **PRESS. PIPE** **OUTDOOR STOP** **SHUNT TIME** **SHUNT COOLING**		
	AUX. HEATER			
		MAX STEP **INTEGRAL A2** **HYSTERESIS** **MAX STEP** **MAX CURRENT** **HOT WATER STOP** **DELAY AFTER EVU**		
		EXT.AUX.HEATER		
			EXT.AUX.HEATER **INTEGRAL A3** **TURN OFF DELAY** **REV.V. HOT WATER** **TOPH. AUX**	
	MANUAL TEST			

Menu	Sub menu	Sub menu	Sub menu	Sub menu
		MANUAL TEST **HEAT PUMP** **BRINE PUMP** **CIRC. PUMP** **REV.V. HOT WATER** **SHUNT** **SYSTEM SHUNT** **HGW-SHUNT** **AUX. HEAT 1** **AUX. HEAT 2** **AUX. HEAT 3** **EXT.AUX.HEATER** **EXT. CIRC. PUMP** **SHUNT DEFR** **FAN L** **FAN H** **EXT. AUX. HEATER** **ALARM** **SHUNT COOLING** **SHUNT GROUP** **2ND H.C SHUNT** **PASSIVE COOLING** **ACT COOLING** **REV. V. POOL** **0-10V**		
	INSTALLATION			
		SYSTEM		
			HEAT SOURCE	
				GROUND OR ROCK
				AIR (BRINE SOLUTION DIRECT EVAP.)
			COOLING	
				PASSIVE COOLING (Ø EXTERNAL INTEGRATED IN HP)
				ACT COOLING (Ø EXTERNAL)
				ROOM SENSOR
			POOL **SHUNT GROUP**	
			BUFFER TANK	
				BUFFER TANK **SYSTEM SHUNT** **2ND H.C SHUNT**
			ADDITION	
				OPTIMUM
				HGW
				0-10V (Ø EXT. AUX. HEATER)
				FLOW SENSOR
				CURRENT LIMITER
				PHASE FAULT (Ø PHASE READING)

Menu	Sub menu	Sub menu	Sub menu	Sub menu
		SERVICE TIME		
		FACTORY SET		
			CANCEL RADIATOR FLOOR	
		RESET OPER. TIME		
		SENSOR CALIBRATION		
			OUTDOOR SUPPLY LINE RETURN LINE HOT WATER BRINE IN BRINE OUT DEFR SENSOR POOL SHUNT GROUP HGW TEMPERATURE BUFFER TANK 2ND HEAT CIR. SYSTEM SUPPLY EXTERNAL FACTOR	
		VERSION		
			DISPLAY I/O-CARD	
		LOG TIME		
		BRINE TIME ON		
		BRINE TIME OFF		
	DEFROST			
		DEFR CURVE 0 DEFR CURVE -XX DEFR TEMPERATURE STOP DEFR BELOW 5°C DEFR MIN TIME DEFR FAN START FAN STOP DEFR SENSOR		
	OPTIMUM			
		TEMP DIFF CIRC. TEMP DIFF BRINE START FLOW CIRC. START FLOW BRINE CONST. FL. CIRC: CONST. FL. BRINE MIN FLOW CIRC. MAX H.W CHARGE HW MIN CHARGE. HW		
	HGW			
		HGW TEMPERATURE TEMPERATURE DIFF HOT WATER DIFF HOT WATER TO RAD MAX TEMPERATURE START HGW INITIALIZING HGW INTEGRAL DELAY HGW-SHUNT TIME HGW INT. BOUND. HGW INTEGRAL PULSE WIDTH		

9.1 Sub-menu HOT WATER

Table 17. Used to change the settings for hot water production.

Menu selection	Meaning	Factory setting
START	Start temperature for hot water production. Shows the actual weighted hot water temperature and the value within brackets indicates the start temperature. (⏻ = no hot water production)	⏻ (range: ⏻, 30°C / 55°C)
HOT WATER TIME	Time for hot water production during combined hot water and heating demand, in minutes.	20M (range: 5M / 40M)
TOPH. TIME	Time in hours that the legionella demand is to be fulfilled for legionella operation to be considered complete.	0M (range: 1M / 10M
HEATING TIME	Time for hot water production during combined heating and hot water demand, in minutes.	20M (range: 5M / 40M)
TOPH. INTERVAL	Time interval between peak heating chargings (anti-legionella function) in days. Operating mode that permits auxiliary heater must be selected.	7D (range: ⏻, 1D / 90D)
TOPH. STOP	Stop temperature for peak heat charging. Operating mode that permits auxiliary heater must be selected.	60°C (range: 50°C / 65°C)
INFL. H.W SENSOR.	Water heater sensor's influence compared with the peak sensor's at start of water heating.	65% (range: 0% / 100%)
WEIGHT HOT WATER	The calculated value of the hot water sensor directed towards the peak sensor.	-

9.2 Sub-menu HEAT PUMP

Table 18. Used to change the heat pump's operating settings.

Menu selection	Meaning	Factory setting
INTEGRAL A1	The integral's value for starting the heat pump. See Important parameters for more information.	-60°min (range: -250°min / -5°min)
HYSTERESIS	If the difference between the actual supply temperature and the calculated supply temperature is too great either the integral value is set to start value A1 (the heat pump starts) or the value is set to 0 (stops the heat pump).	10°C (range: 1°C / 15°C)
MAX RETURN	Stop temperature at high return from the heating system.	55°C (range: 30°C / 70°C)
START INTERVAL	Minimum time interval between two heat pump starts in minutes.	20M (range: 10M / 30M)
ALARM BRINE	Gives an alarm when the outgoing brine temperature falls below the set value.	⏻ (range: ⏻, -14°C / 10°C)
PRESS. PIPE	Sensor on the compressor's hot gas line. The value within brackets indicates maximum permitted temperature. If this value is exceeded, the compressor will stop and start again as soon as the temperature has dropped. No alarm shown in the display, however, a square is shown in the left, lower corner of the display.	140°C
OUTDOOR STOP	Displayed only if AIR is selected. Lowest outdoor temperature when the outdoor sensor stops the compressor and heating or hot water are instead produced by the auxiliary heater.	-20°C (range: -20°C / -1°C)

Menu selection	Meaning	Factory setting
SHUNT TIME	Time in seconds. Indicates how often the shunt is to adjust its opening.	60S (range: 10S / 99S
SHUNT COOLING	The cooling shunt works towards the set temperature.	18°C (range: 0°C / 30°C)

9.3 Sub-menu AUX. HEATER

Table 19. Used to change the heat pump stages' operating settings.

<table>
<tr><th>Menu selection</th><th colspan="2">Meaning</th><th>Factory setting</th></tr>
<tr><td>MAX STEP</td><td colspan="2">Maximum number of permitted steps for auxiliary heating. ⏻ = no auxiliary heating permitted (Means that only AUTO or HEAT PUMP can be selected.)</td><td>⏻
(range: ⏻, 1, 2, 3, 4, 5, +4, +5)</td></tr>
<tr><td>INTEGRAL A2</td><td colspan="2">Two conditions must be fulfilled in order to start the auxiliary heater: the integral's value to start must be less than integral A2, and the supply temperature must be 2°C lower than the calculated temperature. See Important parametersfor more information.</td><td>-600
(range: -50 / -990)</td></tr>
<tr><td>HYSTERESIS</td><td colspan="2">If the difference between the actual supply temperature and the calculated supply temperature is too great (see Important parameters), either the integral value is set to start value A2 (starts the auxiliary heater) or to 0 (stops the auxiliary heater).</td><td>20°C
(range: 5°C / 30°C)</td></tr>
<tr><td>MAX CURRENT</td><td colspan="2">Refers to main fuse in the unit, in amperes</td><td>20
(range: 16 / 35)</td></tr>
<tr><td>HOT WATER STOP</td><td colspan="2">Stop temperature for hot water during AUX. HEATER. The value is read off by the hot water sensor.</td><td>60°C
(range: 50°C / 65°C)</td></tr>
<tr><td>DELAY AFTER EVU</td><td colspan="2">Time in minutes. Indicates how many minutes after EVU are to pass before the auxiliary heater may be activated.</td><td>30M
(range: 0M / 120M)</td></tr>
<tr><td>EXT.AUX.HEATER</td><td colspan="3"></td></tr>
<tr><td></td><td>Menu selection</td><td>Meaning</td><td></td></tr>
<tr><td></td><td>EXT.AUX.HEATER</td><td>Indicates whether an external auxiliary heater is installed in the system.</td><td>⏻ / ON</td></tr>
<tr><td></td><td>INTEGRAL A3</td><td>Indicates the value of the integral when external auxiliary heater is connected.</td><td>-300
(range: -990 / INTEGRAL A1 - 10)</td></tr>
<tr><td></td><td>TURN OFF DELAY</td><td>Indicates how long the external auxiliary heater must continue to be active after its demand is no longer needed.</td><td>0M
(range: 0M / 180M)</td></tr>
<tr><td></td><td>REV.V. HOT WATER</td><td>Indicates whether the exchange valve for hot water is located before or after the external auxiliary heater. (Determines whether the external auxiliary heater may produce hot water.)</td><td>INT / EXT</td></tr>
<tr><td></td><td>TOPH. AUX</td><td>Indicates whether the external auxiliary heater can be used for anti-legionella. The exchange valve must be positioned after the external auxiliary heater.</td><td>⏻ / ON</td></tr>
</table>

9.4 Sub-menu MANUAL TEST

Table 20. Used to manually test and test operate the heat pump's components or signal outputs.

Menu selection	Meaning		Factory setting
MANUAL TEST	0 = deactivate manual test 1 = activate manual test 2 = activate manual test with option of navigating from the SERVICE menu to check that the temperatures rise for example.		-
HEAT PUMP	0 = stop heat pump 1 = start heat pump Note! The heat pump cannot be started in the event of an active alarm.		-
BRINE PUMP	0 = stop the brine pump 1 = start the brine pump		-
CIRC. PUMP	0 = stop the circulation pump 1 = start the circulation pump		-
REV.V. HOT WATER	0 = heating mode for the exchange valve 1 = hot water mode for the exchange valve		-
SHUNT	- = closes shunt 0 = shunt unaffected + = opens shunt		
SYSTEM SHUNT	- = closes shunt 0 = shunt unaffected + = opens shunt	Only at buffer tank	
HGW-SHUNT	- = closes shunt 0 = shunt unaffected + = opens shunt		
AUX. HEAT 1	0 = stop aux. heater step 1 1 = start aux. heater step 1		-
AUX. HEAT 2	0 = stop aux. heater step 2 1 = start aux. heater step 2		
AUX. HEAT 3	0 = stop aux. heater step 3 1 = start aux. heater step 3		
EXT.AUX.HEATER	0 = stop external auxiliary heater 1 = start external auxiliary heater		
EXT.CIRC. PUMP	0 = stop circulation pump 1 = start circulation pump		
SHUNT DEFR	- = opens flow from defrosting tank 0 = shunt unaffected + = closes flow from defrosting tank		
FAN L	0 = stop fan 1 = start fan at low speed		
FAN H	0 = stop fan 1 = start fan at high speed		
EXT. AUX. HEATER	0 = 0V on plinth 283 1 = control voltage 230V on plinth 283		
ALARM	0 = stop signal on output External alarm 1 = start signal on output External alarm		-
SHUNT COOLING	- = closes shunt 0 = shunt unaffected + = opens shunt		-
SHUNT GROUP	- = closes shunt 0 = shunt unaffected + = opens shunt		

Menu selection	Meaning		Factory setting
2ND H.C SHUNT	- = closes shunt 0 = shunt unaffected + = opens shunt	Only at buffer tank	
PASSIVE COOLING	0= stop passive cooling 1= start passive cooling		
COOLING A	0= stop active cooling 1= start active cooling		
REV. V. POOL	0 = normal mode for the exchange valve 1 = pool mode for the exchange valve		-
0-10V	Used for circulation pumps at BUFFER TANK.		-

9.5 Sub-menu INSTALLATION

Table 21. Used for settings that are set during installation.

<table>
<tr><th>Menu selection</th><th>Meaning</th><th>Factory setting</th></tr>
<tr><td>SYSTEM</td><td colspan="2">Sub menu SERVICE -> INSTALLATION -> SYSTEM:

Note! The menu selection in the SYSTEM menu varies depending on the selected values. Tip: start in the top menu and work downwards.

<table>
<tr><th>Menu selection</th><th>Meaning</th></tr>
<tr><td>HEAT SOURCE</td><td>GROUND OR ROCK
OUTSIDE AIR
(BRINE SOLUTION, DIRECT EVAP.)</td></tr>
<tr><td>COOLING</td><td>PASSIVE COOLING
(⏻, EXTERNAL, INTEGRATED IN HP)
COOLING A
(⏻, EXTERNAL)
ROOM SENSOR
(⏻, ON)</td></tr>
<tr><td>POOL</td><td>⏻, ON</td></tr>
<tr><td>SHUNT GROUP</td><td>⏻, ON</td></tr>
<tr><td>BUFFER TANK (See separate instruction for buffer tank)</td><td>BUFFER TANK
SYSTEM SHUNT
2ND H.C SHUNT</td></tr>
<tr><td>ADDITION</td><td>OPTIMUM
(⏻, ON)
HGW
(⏻, ON)
0-10V
(⏻, EXT. AUX. HEATER)
FLOW SENSOR
(⏻, ON)
CURRENT LIMITER
(⏻, ON)
PHASE FAULT
(⏻, PHASE READING)</td></tr>
</table>
</td></tr>
<tr><td>SERVICE TIME</td><td>Note! Only used for test operation. The heat pump counts 60 times as fast, which means that the waiting times are eliminated during test operation.

0 = deactivates SERVICE TIME
1 = activates SERVICE TIME, which speeds up the control system's integral calculation and start delay by 60 times.</td><td>-</td></tr>
</table>

Menu selection	Meaning	Factory setting
FACTORY SET	CANCEL = starting point, no changes made. RADIATOR = reset factory settings for radiator system FLOOR = reset factory settings for under floor heating	-
RESET OPER. TIME	0 = no reset of operating times 1 = reset of operating times to zero	-
SENSOR CALI-BRATION	Following sensors can be found in the installation: OUTDOOR SUPPLY LINE RETURN LINE HOT WATER BRINE IN BRINE OUT DEFR SENSOR POOL SHUNT GROUP HGW TEMPERATURE BUFFER TANK 2ND HEAT CIR. SYSTEM SUPPLY EXTERNAL FACTOR Affects sensors that are installed inside the heat pump.	 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0, (range: -5°C / 5°C) 0 (5°C for DHP-A, DHP-A Opti, DHP-AL, DHP-AL Opti) (range: 0°C / 20°C)
VERSION	Shows the software version which is stored on the display card respectively the I/O-card. DISPLAY: V X.X I/O-CARD: V X.X	-
LOG TIME	Time interval between collection points of temperature history in minutes. The history graphs always show the 60 last collection points, which means that the graphs can display history from 1 hour up to 60 hours ago. (The function is not active if there is an active alarm).	1M (range: 1M / 60M)
BRINE TIME ON	The brine pump starts the set number of seconds before the compressor. Applies at start of heat pump.	30S (range: 10S / 90S)
BRINE TIME OFF	The brine pump stops the set number of seconds after the compressor. Applies at stop of heat pump.	30S (range: 10S / 60S)

9.6 Sub-menu DEFROST

The menu applies to DHP-A, DHP-AL with defrost card and only appears if OUTDOOR AIR in SERVICE -> INSTALLATION -> SYSTEM -> HEAT SOURCE menu is selected.

Table 22. Used to change settings for outdoor unit defrost.

Menu selection	Meaning	Factory setting
DEFR CURVE 0	Used to set the temperature of the heat pump's brine return at which defrosting should start, at 0°C outdoor temperature, using + or -. The graph can be changed up or down at 0°C outdoor temperature in the display. See Important parameters for more information.	-10°C (range: -15°C / -5°C)
DEFR CURVE -xx	Used to set the temperature at which the heat pump's brine return is to start a defrost, at the set outdoor temperature for OUTDOOR STOP, using +or-. The setting is made by reducing the OUTDOOR STOP value by this value. The number of degrees shown after DEFR CURVE in the display is the set value for OUTDOOR STOP. The combined temperature is shown in the top right corner of the display. The graph can be changed up or down at the outdoor temperature OUTDOOR STOP in the display. See Important parameters for more information.	OUTDOOR STOP reduced by 4°C (range: - 8°C / - 1°C)
DEFR TEMPERATURE	The temperature shunted to the outdoor unit during a defrost.	15°C (range: 13°C / 25°C)
STOP DEFR	The temperature that the Brine In sensor must reach to complete a defrost.	11°C (range: 7°C / 12°C)
BELOW 5°C DEFR	Safety defrosting occurs when the outdoor temperature has been below 5°C for a set number of days, shunts +20°C for 10 minutes.	7D (range: ⏻, 1D / 14D)
MIN TIME DEFR	Minimum time between two defrosts in minutes.	45M (range: 10M / 60M)
FAN START	The fan starts when the temperature on the brine in sensor to the heat pump reaches the set value. If FAN START is set to ON, the fans starts and stops at the same time as the compressor and the FAN STOP parameter is inactive.	-2°C (range: ON, -5°C / FAN STOP-3°C)
FAN STOP	The fan stops when the temperature on the brine in sensor to the heat pump reaches the set value.	17°C (range: FAN START +3°C / 30°C)
DEFR SENSOR	Shows the actual temperature of the incoming air to the outdoor unit.	

9.7 Sub menu OPTIMUM

The menu applies to Opti with speed controlled circulation pumps and only appears if ON in SERVICE -> INSTALLATION -> SYSTEM -> ADDITION -> OPTIMUM menu is selected.

Table 23. Used to change the circulations pumps' operating settings.

Menu selection	Meaning	Factory setting
TEMP DIFF CIRC.	Desired temperature difference between supply and return line for the heating system.	8°C (range: ⏻, 0°C / 15°C)
TEMP DIFF BRINE	Desired temperature difference between supply and return line for the brine system.	3°C (range: ⏻, 0°C / 15°C)

Menu selection	Meaning	Factory setting
START FLOW CIRC.	Speed control of the heating system's circulation pump in Volts. Higher voltage gives a greater circulation pump speed, which gives a lower temperature difference. A low voltage gives a greater difference. 3 - 10 = Manually adjustable speed, where 3 is low voltage and 10 is high voltage.	7V (range: 3V / 10V)
START FLOW BRINE	Speed control of the brine system's circulation pump in Volts. Higher voltage gives a greater brine pump speed, which gives a lower temperature difference. A low voltage gives a greater difference. 3 - 10 = Manually adjustable speed, where 3 is low voltage and 10 is high voltage.	10V (range: 3V / 10V)
CONST. FL. CIRC.	If TEMP DIFF CIRC is set to ⏻ the flow is continuous with this value in the heating system. Value indicated in Volts.	7V (range: 3V / 10V)
CONST. FL. BRINE	If TEMP DIFF BRINE is set to ⏻ the flow is continuous with this value in the brine system. Value indicated in Volts.	10V (range: 3V / 10V)
MIN FLOW CIRC.	Lowest permitted voltage (speed) of the circulation pump's flow in the heating system. If there is no heat demand, there may still be a demand to read in the temperatures for the sensors in the system and the circulation pump therefore must be run.	3V (range: 3V / 10V)
MAX H.W CHARGE HW	Highest supply temperature during water heating.	55°C (range: 45°C / 65°C)
MIN CHARGE. HW	Lowest desired supply temperature during water heating.	50°C (range: 30°C / 65°C)

9.8 Sub-menu HGW

The menu applies to the Opti Pro-modelswith de-superheater and only appears if ON in SERVICE -> INSTALLATION -> SYSTEM -> ADDITION -> HGW menu is selected.

Table 24. Used to change the de-superheater's operating settings.

Menu selection	Meaning	Factory setting
HGW TEMP.	Shows the HGW sensor after the de-superheater (the supply temperature to water heater) in °C.	-
TEMP DIFF	Desired difference between the HGW sensor and water heater's start sensor.	20K (range: 15K / 35K)
HOT WATER DIFF.	Shows actual difference between the HGW sensor and water heater's start sensor.	-
HOT WATER TO RAD.	If there is a heat demand, the HGW shunt switches to the heating system when the weighted value is greater than the total of the START temperature for hot water and this value. Example: 40°+3K = at a temperature of 43°C in the water heater, the shunt switches to the heating system.	3K (range: 1K / 10K)
MAX TEMP.	Max temperature of the water in the water heater. The temperature is measured on the peak sensor in the water heater. Note! Domestic hot water can have this temperature, which can mean that an external mixer valve may be required.	95°C (range: 60°C / 100°C)
START HGW	The number of seconds the HGW shunt is to open at HGW start is the starting point of shunt opening. The opening time for the HGW shunt from fully closed to fully open towards the water heater is 30 seconds.	7S (range: 0S / 30S)
INITIALIZING HGW	The time in seconds before control of HGW shunt starts after HGW start.	60S (range: 10S / 90S)

Menu selection	Meaning	Factory setting
INTEGRAL DELAY	Delay of integral calculation in seconds after the integral value for HGW has been reached.	10S (range: 5S / 120S)
HGW-SHUNT TIME	The time that the signal is active to open or close the HGW shunt completely.	35S (range: 15S / 60S)
HGW INT. BOUND.	Integral value (parameter) for HGW.	60 (range: 10 / 120)
HGW INTEGRAL	Shows the actual value for the HGW integral. Plus indicates that the shunt opens towards the water heater and minus indicates that the shunt opens towards the heating system.	-
PULSE WIDTH	How long the plus or minus signal to the shunt is to be high when the HGW integral has been reached.	0.25S (range: 0.20S / 1.00S)

10 Commissioning

10.1 Filling the water heater and heating system

1. Fill the water heater with cold water by opening the filler valve that is on the valve pipe.
2. Bleed by opening one of the hot water taps.
3. Then fill the water heater coil and the heating system with water through the filling valve to a pressure of approx. 1 bar.

10.2 Bleed the heating system

1. Open all radiator valves fully.
2. Bleed all radiators.
3. Refill the heating system to a pressure of approximately 1 bar.
4. Repeat the procedure until all air has been removed.
5. Leave the radiator valves fully open.

10.3 Filling the brine system

Caution! Before filling the brine system, the electrical installation must be completed so that it is possible to operate the brine pump.

Caution! Before filling the brine system for DHP-A, DHP-AL, the water heater **MUST** be filled.

Note! Always check local rules and regulations before using anti-freeze.

Note! Anti-freeze with corrosion protection additives must be used and mixed to achieve frost protection down to -15°C for DHP-H, DHP-L and DHP-C..

Note! Use only ethylene glycol as anti freeze for DHP-A and DHP-AL, mixed to achieve frost protection down to -32±1°C.

10.3.1 Calculated volume DHP-H, -C, -L

The volume of the brine system is calculated as follows:

- Heat pump (exchanger and piping) approximately 2 litres
- Expansion tank approximately 3 litres
- Collector (single pipe): PEM 40 approximately 1.0 litre/m; PEM 32 approximately 0.6 litre/m; Cu 28 approximately 0.5 litre/m

10.3.2 Calculated volume DHP-A, -AL

The volume of the brine system is calculated as follows:

- Heat pump (exchanger, pipe and outer jacket) approximately 47 litres
- Expansion tank approximately 3 litres
- Outdoor unit approximately 7 litres
- Collector (single pipe): 28 mm pipe approx. 0.5 litre/m

10.3.3 Filler cock

When the filler cock is installed on the return pipe, remember to turn the strainer cover upwards in order to minimise the amount of air that gets into the brine system when cleaning the filter.

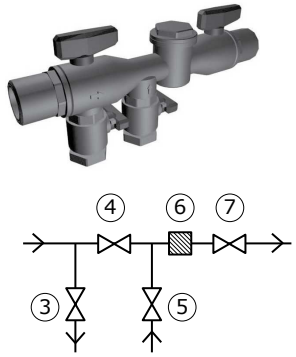


Figure 44. Filler cock

Symbol explanation

3	Shut-off valve
4	Shut-off valve
5	Shut-off valve
6	Strainer
7	Shut-off valve

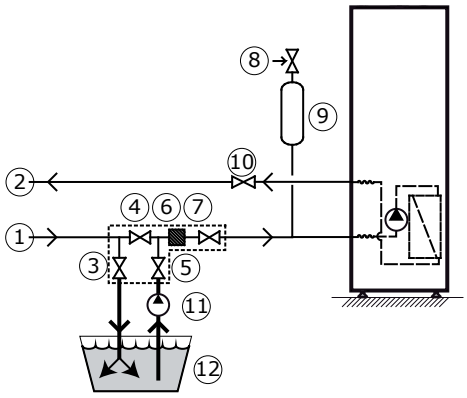


Figure 45. Filling the brine system

Symbol explanation

1	Brine in
2	Brine out
3	Shut-off valve (part of the filler cock)
4	Shut-off valve (part of the filler cock)
5	Shut-off valve (part of the filler cock)
6	Strainer (part of the filler cock)
7	Shut-off valve (part of the filler cock)
8	Safety valve 1.5 bar
9	Bleed and expansion tank
10	Shut-off valve
11	External pump
12	External container

1. Set the heat pump operating mode to "OFF" in the control computer menu INFORMATION -> OPERAT.
2. Mix water and anti-freeze in the correct proportions in an external container (12). Note that each pack must be well mixed.
3. Check that the freezing point of the mixture is reached using a refractometer (-15°C for DHP-H, DHP-C andDHP-L), (-32±1°C for DHP-A, DHP-AL).
4. Fill the system with the mixture using an external pump (11) which can bleed the brine pipes. Connect the pressure side of the pump to the filler connection at valve (5).
5. For DHP-A, DHP-AL: open the defroster shunt in the control computer menu SERVICE -> MANUAL TEST -> SHUNT DEFR, set the value to -.
6. Close valve (4).
7. Open valves (5) and (10).
8. Connect a transparent hose (3) that opens out into the external container (12).
9. Open valve (3).
10. Start the external pump (11) and fill the brine pipes.
11. Start the brine pump manually in the control computer menu SERVICE -> MANUAL TEST -> BRINEPUMP, set the value to 1.
12. Run the brine pump and the external pump (11) in series until fluid, clear of air, comes out of the return hose from the valve (3).

13. Stop the brine pump in the control computer menu SERVICE -> MANUAL TEST -> BRINEPUMP, set the value to 0, at the same time leave the external pump running.
14. Open valve (4) with the external pump running to eliminate the air between the valves (3) and (5).
15. Close valve (3) and pressurise the system using the external pump.

Caution! Max 150kpa (1.5 bar)

16. Close valve (5).
17. For DHP-A, DHP-AL: close the defroster shunt in the control computer menu SERVICE -> MANUAL TEST -> SHUNT DEFR, set the value to 0.
18. Stop the external pump (11) and disconnect the filling equipment.
19. Install insulation on the filler cock.

10.4 Bleed the brine circuit

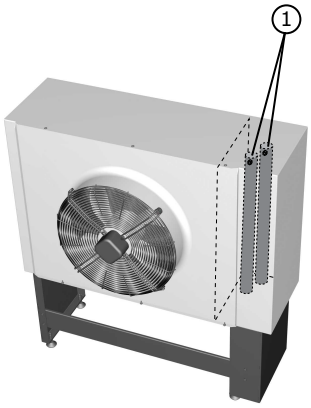
Note! When topping up, the brine pump must be running.

1. Start the brine pump in the control system's menu SERVICE -> MANUAL TEST -> BRINEPUMP, set the value to 1.
2. Check that the level in the bleed tank (9) is stabilised.
3. Dismantle the safety valve (8) on the bleed tank.
4. Top up with brine to 2/3 of the tank through the connection on which the safety valve (8) was installed.
5. Leave the brine pump running so that that the air in the system collects in the bleed tank.
6. As air separates in the bleed tank the fluid level drops, top up as in step 4.
7. Reinstall the valve (8) when all air has been removed from the system.
8. Open valve (8) and release any overpressure. The fluid level should not fall below 2/3 of the height of the tank.
9. Check that valve (3) is closed.
10. Stop the brine pump in the control system's menu SERVICE -> MANUAL TEST -> BRINEPUMP, set the value to 0.
11. Switch to the desired operating mode if the heating system has been filled and bled.

Collect any excess brine in a plastic container for topping up the system if necessary (leave it with the customer).

10.5 Bleed the outdoor unit

If the outdoor unit is installed higher than the heat pump with a pressurised brine system, the outdoor unit must be bled using the bleed screws (1) on the connection pipes. The side covers of the outdoor unit must be removed to access the bleed screws.



Symbol explanation

1	Bleed screws

Figure 46. Location of bleed screws

If the outdoor unit is installed at the same level or lower than the heat pump it is recommended that the brine circuit in the outdoor unit is also bled. After bleeding, the side panels and decor front panel must be installed.

10.6 Start up

Note! Read the safety instructions!

Caution! The installation may only be commissioned if the heating system, water heater and brine system have been filled and bled. Otherwise the circulation pumps can be damaged.

Caution! Any alarms that may occur in connection with the installation must be fault-traced.

Caution! If the installation is only to operate using an auxiliary heater during the installation, ensure that the heating system is filled and bled and that the compressor cannot be started. This is carried out by setting the operating mode to INFORMATION --> OPERAT.--> AUX. HEATER

Caution! For heat pumps DHP-H Opti Pro SP and DHP-L Opti Pro SP (1-phase) it is imperative that the hot water temperature changes from default setting 95 °C to 85 °C.

10.6.1 Installation checklist

Before manual test operation, the following points must be checked to ensure that they have been correctly carried out:

- Piping installation
- Electrical Installation

10.6.1.1 Piping installation, heating system

- Pipe connections in accordance with the connection diagram
- Flexible hoses on the supply and return lines
- Pipe insulation

- Strainer on return line
- The heating system has been bled
- All radiator valves fully open
- Expansion tank heating system (not included in the delivery)
- Safety valve for expansion tank (not included in the delivery)
- Filler cock heating system (not included in the delivery)
- Leakage inspection

If a an external water heater is installed, also check:

- Reversing valve
- Safety valve for cold water (9 bar)

10.6.1.2 Electrical Installation

- Circuit-breaker
- Fuse protection
- Direction of rotation of the compressor
- Coolant pump
- For DHP-A, outdoor unit
- For DHP-A, defrost sensor
- Positioning of the outdoor sensor
- Control computer settings

If a an external water heater is installed, also check:

- Reversing valve

10.6.1.3 Brine system

- Expansion/bleed tank on the return pipe
- Safety valve for expansion tank
- Filler cock on the return pipe
- Insulation in the outside wall lead-in
- Other brine pipe insulation
- Bleeding brine
- Leakage inspection

10.6.2 Manual test

Test operate and at the same time check the function of the components.

10.6.2.1 Activate MANUAL TEST

1. Ensure that the main circuit breaker is on.
2. Select operating mode ⏻, in the menu INFORMATION -> OPERAT.-> ⏻
3. Open the SERVICE menu by pressing and holding < in for five seconds.
4. Set the value for MANUAL TEST to 2.

Note! Set MANUAL TEST to 2 to navigate away from the menu during ongoing test operation.

10.6.2.2 Test the brine pump

1. Start the brine pump by setting the value BRINE PUMP to 1.
2. Check that the brine pump is running by:
   - listening
   - putting a hand on the pump
   - checking that the level in the expansion tank is stable. If the level is not stable there is air in the system.
   - listen for air
3. If the pump does not start automatically, perform manual start.
4. If there is air in the brine system, bleed the system.
5. Stop the brine pump by setting the value to 0.

10.6.2.3 Test the circulation pump

1. Start the heating system circulation pump by setting the value CIRC. PUMP to 1.
2. Check that the circulation pump is running by carrying out the following:
   - Listen
   - Place a hand on the pump
   - Listen for air
3. If the pump does not start, see Starting circulation pumps manually.
4. If there is air in the heating system, bleed the system, see Bleed the heating system.
5. Stop the circulation pump by setting the value to 0.

10.6.2.4 Test the exchange valve

1. Activate the 3-way valve by setting the value REV.V. HOT WATER to 1.
2. Check that the indicator on the exchange valve's upper side changes position.
3. If the indicator does not change position, perform fault tracing.

10.6.2.5 Test the compressor

1. Start the circulation pump by setting the value CIRC.PUMP to 1.
2. Start the heat pump compressor by setting the value HEAT PUMP to 1. At the same time as the value is set to 1 for HEAT PUMP the brine pump starts.

Warning! Risk of burn injury, the pressure pipe on the compressor can get up to 70-80 degrees in temperature after operating for a while!

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3. Check that:
   - the compressor is running in the right direction by putting a hand on the pressure pipe before the compressor starts, the pipe is then cold. Feel again after a short while to ensure the pressure pipe becomes properly hot.
   - it sounds normal and there is no noise.
4. If the pipe does not get hot, or if the compressor sounds abnormal, perform fault tracing according to the service instructions.
5. Stop the compressor by setting the value to 0.
6. Stop the brine pump by setting the value to 0.
7. Stop the circulation pump by setting the value to 0.

10.6.2.6 Testing the auxiliary heating power stages

1. Start the circulation pump by setting the value CIRC. PUMP to 1
2. Start the first auxiliary heating power stage by setting the value ADD.HEAT 1 to 1.

3. Check that the auxiliary heater step works by exiting the MANUAL TEST menu and entering the INFORMATION -> TEMPERATURE -> SUPPLY LINE menu and check that the temperature rises.
4. Return to the menu MANUAL TEST and stop AUX. HEAT 1 by setting the value back to 0.
5. Repeat the steps in AUX. HEAT 1 for AUX. HEAT 2 and AUX. HEAT 3.
6. Stop the circulation pump by setting the value to 0.

10.6.2.7 Test the outdoor unit for DHP-A, -AL

1. Start the defroster shunt by setting the value SHUNT DEFR to -(minus). Check that the shunt motor is drawing current.
2. Start the fan at low speed by setting the FAN L value to 1. Check that the fan runs at low speed.
3. Start the fan at high speed by setting the FAN H value to 1. Check that the fan runs at high speed.

10.6.2.8 Exit test operation

Set the value for MANUAL TEST to 0.

10.7 Commissioning

10.7.1 Starting circulation pumps manually

If any of the circulation pumps do not start, it may need to be helped as follows:

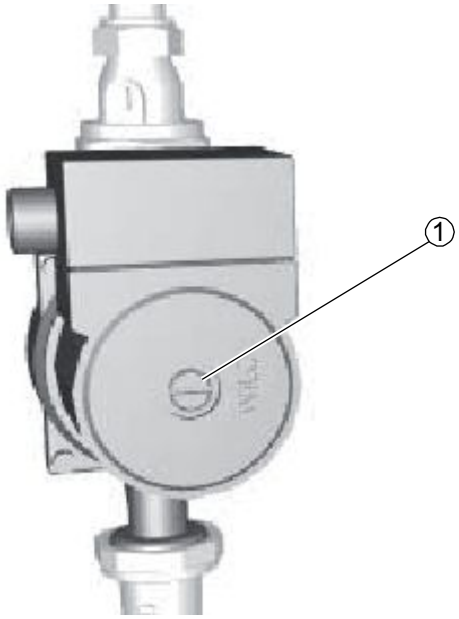

Figure 47. Location of the bleed screw

Caution! When bleeding the circulation pumps, water can come into contact with electrical components. Therefore, protect the electric panel against water.

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1. Open and remove the bleed screw on the front of the pump. Ensure to catch the water that runs out when the screw is removed.
2. Insert a flat blade screwdriver and turn it in the direction of rotation of the pump (clockwise).
3. Reinstall the bleed screw with its rubber seal.

10.7.2 Adaptation to the heating system

Adjust the heat pump settings to the applicable heating system, for instance an underfloor heating or radiator system. The delta temperature must be at least 8°C above the heat pump. The delta temperature should be 3–5°C for the brine system. If one of the ΔT is not reached, the flow of the circulation pumps may need adjusting depending on the applicable heating system.

10.7.2.1 Noise check

During transportation and installation there is a certain risk that the heat pump can be damaged, components may move or get bent and this can cause noise. Because of this it is important to check the heat pump when it has been installed and is ready to be commissioned to ensure that everything is in order. The heat pump should be tested in both heating and hot water modes to ensure that there is no abnormal noise. While doing this, check that there is no abnormal noise in other parts of the house.

Noise is produced from the outdoor unit when the fan is in operation, check during that manual operation that there is no disturbance in your own home as well as to any neighbours. A noise kit is available for purchase for the outdoor unit for DHP-A 10 and 12 if it is necessary to reduce the noise.

10.7.2.2 Select operating mode

Set the heat pump to the desired operating mode in the menu INFORMATION -> OPERAT. If necessary, set certain parameters in the control system, such as ROOM and CURVE.

10.7.3 Installing the front cover

Caution! Take care not to damage the front cover or display cables!

1. Hook on the lower edge of the front cover.
2. Carefully press the front cover's upper edge towards the heat pump.
3. Turn the catch in the top panel 90 degrees clockwise.

10.7.4 After start up

Note! Remember that it takes time for the heat pump to heat a cold house. It is best to let the heat pump work at its own pace and NOT raise or alter any values in the control system to try to heat it up more rapidly.

Caution! If there is an alarm in conjunction with commissioning it usually means that there is air in the system.

10.8 Trimming the heating system

To obtain a heating system balance and obtain an even and comfortable indoor temperature, you must adjust your heating system according to the example below.

Note! Adjust the heating system during the winter to obtain the greatest possible output.

Note! Trimming must be carried out over a few days as the inertia in the heating system causes the indoor temperature to change slowly.

1. Choose one of the house's rooms as a reference room for the indoor temperature, where the highest temperature is required, 20-21°C.
2. Place a thermometer in the room.
3. Open all the heating system's radiator valves fully.
4. Leave the heat pump's ROOM value set at 20°C. See Setting ROOM values for more information.
5. Note the temperature in the reference room at different points in time over a 24 hour period.

6. Adjust the ROOM value so that the reference room reaches your required indoor temperature of 20-21°C. Remember that other rooms will have different temperatures during trimming, but these are adjusted later.
7. If the ROOM value must be adjusted more than 3°C upwards or downwards the CURVE value must be adjusted instead. See Adjusting CURVE values for more information.
8. If the indoor temperature varies several degrees despite trimming, a specific part of the heat curve may need adjusting. Check at what outdoor temperature the variation is greatest and adjust the curve at the corresponding value (CURVE 5, CURVE 0, CURVE -5). See Adjusting a specific part of the heat curve for more information.
9. When the reference room has an even temperature of 20-21°C over a 24 hour period, you can adjust the radiator valves in the other rooms so that their indoor temperatures are the same temperature or lower than the reference room.

10.9 Customer information

After commissioning is complete, the customer must be informed about their new heat pump installation. Below is a checklist regarding the information that the installer must give the customer:

- The model of the heat pump that has been installed
- Run through the User manual and show what it contains
- Describe the various operating modes and what they mean
- Describe the most common alarms and corrective actions
- Demonstrate how to navigate the control system and which settings the customer can set themselves
- Demonstrate how to view history and operating times
- Show the pipe installation and go through the periodic maintenance actions that the customers must be aware of:
  - check the recommended pressure on the manometers
  - fill the heating system
  - exercise safety valves
  - clean strainers
- Explain how the customer can tune their existing heating system according to the instructions in the User manual
- The applicable warranties
- Where the customer is to turn for servicing
- Finally, fill in the references at the back of the Maintenance instructions.

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